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EDITORIAL NOTES.

The Gas Industry and Sulphuric Acid Manufacture.

IN dealing with the newly-issued Model Clauses last week, comment was made upon the inclusion in them, in defiance of the well-known recommendations of the Joint (Gas Residuals) Committee of the two Houses of Parliament, of the one-third purchase restriction. The matter cannot be left there. The gas industry won a fight forced upon it by the chemical manufacturers; and it has a right to the maintenance of the result of the fight, which confirmed the pre-existing conditions. Without any inquiry equal in character to that made by the Joint Committee, steps have been systematically taken to steal (in part surreptitiously) from the industry the restored position—first through the Model Clauses framed for last session, then, in face of strong resistance, through the Suburban Gas Company's Act and the Swansea Provisional Order of last session, and now through the one-third restriction imposed upon the two Companies being incorporated in the Model Clauses. We hope that gas undertakings will not include the new clause in their promotions, but will adopt the recommendation made in our leading article of last week, and, if necessary, contest this question of principle step by step. It is a duty that every gas undertaking owes to the industry; for a greater piece of parliamentary injustice than this has never been done to any industry. The situation is tantamount to a decision in litigation having been obtained from the House of Lords, and then the machinery of the law declining to give effect to it. Certain it is, that the matter will not rest where it is at the present time.

If the position had been maintained where the Joint Committee had left it, we undertake to say that, in the open residuals market, the chemical manufacturers would not have been one whit worse off than they were before. But their action, and their resolution in taking every possible available course by which they could trample under foot the principles contended for by the gas industry, and upheld by the Joint Committee, cannot possibly improve the friendly relations between them and the industry. It will be remembered that the opening attack on the industry of which there is knowledge was made by Mr. William Pearce, M.P., at a meeting of the Chemical Section of the London Chamber of Commerce, prior to the appearance of the Alkali Manufacturers' Association in opposition to the Gas Bills of the session of 1912. Mr. Pearce was an active witness that session. He and Dr. Rudolph Messel were, on behalf of the chemical manufacturers, the first two witnesses before the Joint Committee; and they are both Directors of Messrs. Spencer Chapman and Messel, Limited, who are largely interested in the production and sale of sulphuric acid. The spent oxide of gas-works is extensively employed in the manufacture of sulphuric acid, and the sulphuric acid is used in the production of sulphate of ammonia. Therefore gas undertakings have a very good reason indeed, providing they are on a sufficiently large scale, for making sulphuric acid on their own account. Mr. Pearce himself, in his evidence before the Joint Committee, admitted that gas-works being producers of sulphur as a bye-product was a reason why the chemical manufacturers could not come before the Committee and plead that gas-works should not be allowed to make sulphuric acid. But all gas companies, though producing spent oxide, are not individually on a large enough scale to manufacture sulphuric acid, and all do not convert their ammoniacal liquor into sulphate of ammonia. It is, however, an obligation upon all gas undertakings to make the best possible use of their residuals whatever their nature. If obstacles are set up, through the instrumentality of interested parties, and in defiance and contempt of the only tribunal that has ever fully considered the matter of unrestricted residuals markets, it is for the gas industry to see how best it can otherwise maintain freedom of action in this connection.

The production of sulphuric acid is a good case in point. Many gas undertakings are large enough to enter upon its manufacture on their own account; but there is still another way in which (and no one can object to this) the share or stock holders of those gas undertakings which are not large enough to manufacture acid on their own account can do so—that is, by private enterprise. In other words, by the formation of an independent manufacturing company or companies capitalized by the private money of gas shareholders, which company or companies would be quite of ordinary manufacturing and trading character, just as free from restriction as are the present makers of sulphuric acid, and so capable of competing with them on terms of perfect equality. Not a penny of the authorized capital or funds of gas undertakings would be invested in the new concern, any more than a penny of the money of chemical manufacturers need be invested in any gas undertaking. Even larger gas undertakings might find it more economical to take advantage of such a scheme than manufacture on their own account, as, of course, a small plant cannot possibly work so economically as one of larger capacity, and one capable of meeting the requirements for different grades of acid. For taking such action as this against the *pseudo*-commercial principle that one party in the residuals markets should be under restriction while all others should be free (it is about the only effective action, other than a cessation of hostilities by the chemical manufacturers, or a clear decision by Parliament that it will not connive at the travesty of justice which has been committed, at the instance of the chemical manufacturers, by the violation of the Joint Committee's verdict), those who are interested as shareholders in the gas industry have a good precedent. Germany is at war with England; the Government and the Board of Trade are assisting home industries in absorbing some of the trade done here by the "enemy." The chemical manufacturers have chosen to disturb the relations that existed between them and the gas industry, and to enter on a war with the view of tying its hands. The share and stock holders of the industry (where independent plants are not set up for the manufacture of sulphuric acid, and perhaps other commodities for which the residuals of gas manufacture supply the base) are at perfect liberty to launch a company or companies, with works conveniently situated, and independently capitalized, for the supply of sulphuric acid to gas-works, and to compete for custom beyond.

The business is a considerable one. Different grades of sulphuric acid are required for many purposes, and so the field is not only large but diverse. But although gas undertakings produce the principal of the fundamental elements required in the manufacture of the acid, there are few of them that manufacture it. Yet a very large number require considerable quantities. There must be quite a respectable number that need (say) 800 tons of sulphuric acid a year. This was the size of the plant with which Mr. Fletcher W. Stevenson (who had had previous experience at Sheffield) commenced the manufacture of sulphuric acid at Coventry in 1904-5, and in consequence saved money for the Corporation Gas Department. This we find from his evidence before the Joint Committee in 1912; and we also see from other evidence that the South Suburban Gas Company (who were the first to have the one-third part residuals purchasing restriction placed upon them last session) were in 1912 using about 1600 tons a year. At the time of the inquiry, Mr. Stevenson had developed his plant to a capacity of 1500 tons a year. The 800-ton sulphuric acid plant was, to the best of his belief, the smallest one in the country; and speaking of the year of its installation (of course, the market prices of sulphuric acid vary with time and situation), he said the cost of acid to the Gas Department was then "reduced, owing to manufacturing it ourselves, from "40s. and 42s. per ton of sulphate made to 26s. 2d. and

"26s. 9d." With the enlargement of the plant in 1911, the production was cheapened; and the Gas Department were then enabled to supply a commercially pure acid to other people. It is thus seen that the small plant paid the Corporation well, through enabling them to lower their sulphate of ammonia costs; while the larger one paid them better. The plant is no doubt costly; but it produces economy. In these days of lower prices for sulphate of ammonia, it is imperative that every possible economy should be achieved, to help to restore as widely as possible the margin between production costs per ton and the sale price.

Anyway, the evidence is that there is profit for gas undertakings large enough to produce sulphuric acid on their own account to do so, and be free from the vagaries of market prices, and the control of other outside influences, to which so much attention has been directed during the campaign of the chemical manufacturers. There is also abundant belief that co-operation between gas shareholders in capitalizing an independent company for establishing, under proper technical supervision, acid-producing works in suitable areas would likewise be a lucrative proceeding. The matter, of course, requires consideration; and to its consideration the gas industry is driven by hostility and gross injustice. In the consideration, the question of locality for the establishing of sulphuric acid plants is an important one. Mr. Charles Carpenter, D.Sc., pointed this out in his evidence before the Joint Committee; and it is most important, because locality bears upon cost as well as the question of nuisance. For instance, no one (the experience of the same witness led him to think) would put down plant at the Sydenham works of the South Suburban Gas Company; and we have no doubt the Chairman of the Company (Mr. Charles Hunt) and the Engineer (Mr. S. Y. Shoubridge) would be prepared to confirm this. But judging from the evidence given by Mr. Hunt last session as to the position of the Company's new site at Belvedere, there could be no objection whatever to a plant there.

However, here is the suggestion as to extending the production of sulphuric acid among gas undertakings, or by an independently capitalized company—a suggestion entirely arising out of the development of information produced by the chemical manufacturers' own action. One more passage from Mr. Carpenter's evidence before the Joint Committee: "I think the production of sulphuric acid is a very "important thing in the industry generally; and I do not "think it would be right, in the interests of the industry "generally, that its supply should be limited." There for the present we quit the subject. The suggestions are for those concerned to take up or leave.

Varied Interest at the Southern Meeting.

THERE was little indication at last Thursday's meeting of the Southern District Association (held under the presidency of Mr. Thomas Glover, of Norwich) that the country is now engaged in a war of unprecedented magnitude. There were absentees whom one is accustomed to see at the meetings, but who are now on official duty with His Majesty's forces. During tea, there was private talk, but at the meeting no general open discussion as originally intended, regarding the effects of the war on the southern gas undertakings. But though these effects are not by any means pleasant ones, the spirits of the members in no wise evinced the fact. What may be taken as a general view in the Southern Counties of the position created by the war is to be found in the report presented from the Commercial Section, and which is reproduced in our account of the proceedings at the meeting. There was also a report and an interesting little discussion on the subject of the education of gas-fitters, to which further reference will be made presently. But the outstanding feature of the meeting was the paper—"lecture" would be a better term—by Mr. Samuel Glover, of St. Helens, on the microscopical examination of coal.

The delicate and profoundly interesting subject was well handled by Mr. Glover, and, with the true engineer's concern for detail, he made the lecture strikingly instructive by some wonderfully prepared microscopical sections of coal, several of which were projected on to a lantern screen, and microscopes were also provided for the use of the members in making examination of the sections. A word of acknowledgment should be made of the skill of Mr. James Lomax (whose son was present with Mr. Glover) in preparing the coal sections. The work is marvellous; and it is due to his discovery of a method of producing these sections for study in a manner never before achieved, that Mr. Lomax has added considerably to our knowledge of the structure, composition, and general physical characteristics of coal, and in doing so has subverted many of our preconceived notions. Association with Mr. Lomax has induced Mr. Glover to take up the microscopic study of coal, and to read from what is so disclosed something of the history of the coal, and of its value for various practical purposes. Enthusiasm following new interest, he has taken upon himself the *rôle* of inculcator in this relation among his professional colleagues; and his success in this capacity will be measured by the stimulus that his handling of a subject so pregnant of interest gives to its wider study. To the gas engineer, coal is coal; and he determines value by the yield of the products which he can experimentally obtain from it. It is his shortest route to ascertaining a coal's compliance or otherwise with his needs. The preparation of microscopic sections by the clever expert would be a long road to the commercial objective, and would then not give the comparative (or even approximate) data required. The commercial assessment of the value of a coal microscopically is, of course, not what Mr. Glover advocates the study for; his idea simply being that large users of coal should know as much as possible of its inherent characteristics. At the same time there is practical value in being able to make an examination of a small section which will inform the observer whether a certain seam of coal will be suitable for gas making and coke production, and whether it will be liable to spontaneous combustion, given the necessary promoting conditions. It is a large subject; and Mr. Lomax's study and ingenuity have shown it to be so. It is one, too, of everlasting variety, owing to the dissimilarity of characteristics to be found in most seams of coal both vertically and at different parts of their length or area.

There still appears to be some misconception among gas engineers as to what is really desired in connection with the education of the gas-fitter, over which there has been so much discussion for some years. The mistake has been made that what has been done will produce a crop of paper-trained certified gas-fitters without much practical capacity. But, as the President pointed out during the discussion of the subject on Thursday, no one can be a candidate for a certificate before he has had three years' practical training. This is a complete answer to the misconception. Plumbers are now certified; and the art and practice of gas-fitting are to-day quite as important to the community as the art and practice of plumbing, and the industry can do with certified training of, and competence in, the men who form such a potent branch in every gas undertaking's business, and on whose work largely depends satisfaction or otherwise. They must to-day be highly specialized workmen; and the greater their initial efficiency the better. For the greater the initial efficiency, the larger the capacity for reading the lessons of daily experience, and assimilating knowledge of all subsequent developments in gas appliances. Mr. Edward Allen appealed to gas engineers, out of a sense of loyalty to the interests of the industry, to do their utmost to set up classes for the educational work, and make them a great success. There is some disappointment that in the different areas of the country more classes have not been started, as this shows a want of interest or a satisfaction with things as they exist. The fact of smallness of number throws a greater responsibility upon those who have been instrumental in starting classes already; inasmuch as, if the object in view is to be attained throughout the industry, only the success of the classes established will have influence in developing the work in other quarters—their non-success will cause a complete collapse of the scheme.

Another point was made during the discussion; and this was as to the antagonism of the plumbers up North to the educational and certification scheme, with championship of their cause on the part of the labour members of local councils. Fortunately, the trouble does not exist down South. But the plumber up North appears to be an absolute sort of person. He may be certified; the gas-fitter ought not to be. He should be allowed to do gas-fitting; the gas-fitter should not be permitted to do the small amount of plumbing that is necessary in connection with gas-heated water appliances. The gas industry cannot allow their work to be impeded by narrow-minded obstructionists; and it is rather a self-impeachment of the intelligence of the labour members of any local council that they should countenance and support such a fatuous attitude. Why the plumbers should claim preferential rights in the directions indicated

surpasses us. They really know little or nothing of gas-fitting and modern gas appliances. What the industry is aiming at is to raise the efficiency of the gas-fitter by systematized training, and to give him a certificate of proficiency. This higher efficiency is required throughout the country; and it will for the men be one of the best assurances of permanence of employment. If the scheme is a success, the time will come when the man with a certificate will be sought after, and the man without one will be at a disadvantage. On these and all grounds, gas-fitters—full blown and budding—should aid gas engineers and gas undertakings in pushing forward the scheme.

Novelties in Retort-Benches and Working.

RETORT-BENCH designers and builders of America appear to be vieing with each other to see who can introduce the most novelties into their work. The object, of course, of each fresh introduction is a useful one; but whether all of them accomplish this purpose, and add to carbonizing operations fresh efficiency, is a matter which, from a distance, one cannot possibly gauge, though from general experience one can conjecture a bit. Some of the novelties possess obvious advantage if reliable. Quite a bevy of them appear in the report which was presented, at the recent meeting of the American Gas Institute, by the Committee dealing with the progress of carbonization methods in the United States. For a long term of years when carburetted water-gas plant obtained the upper place in gas-manufacturing processes in the States, development in coal-gas plant there remained practically stationary. But during the past few years, there has been a revival of its application; and with this revival, a distinct trend towards the supplementing and improvement of detail. It appears, for example, to be quite a common thing now for retort-charging machinery to be fitted with automatic devices for weighing the charges; and this has also been extended to the fuel fed into the producers. If this automatic weighing, in the rush and heat of the retort-house, can be relied upon, it will be valuable, for the purpose of obtaining exact control and reliable working data, which are *desiderata* to-day. There is a good deal of guesswork about what is done at the present time in connection with both the quantity of coal placed in the retorts and of fuel fed into the producers, and it would be a good thing to have this crudeness deposed. There are several references to what is known as Doherty's carbon dioxide return system, which is not described in detail, but which seems to have earned for itself some distinction, more on account of the claim than to any other advantage (which claim is evidently supported by experience) that it eliminates all local heating. Naturally where local heating is eliminated, it follows that there should be—assuming proper working conditions throughout—a more uniform retort temperature, and, as a consequence of uniformity, a prolongation of life. In settings in which this system has been incorporated, dampers are not used to regulate the amount of producer gas entering the combustion chamber; their employment, it is stated, being unnecessary.

In another part of the report, there is allusion to a simple and inexpensive mode of introducing steam under the grates of retort-benches. A successful attempt appears to have been made to reduce the time of charging retorts and to, during the process, limit the time of their exposure to the atmosphere. Generally speaking, the signalling systems to opposite ends of retorts when opening and closing lids and filling producers, are somewhat clumsy, traditional devices. But there is described in the report a method whereby the lid on each retort on the producer side is locked, and cannot be released until the lid on the charging side has been opened; and therefore the charging operation cannot be performed until the lid on the opposite side has been opened. This, however, seems to have been devised chiefly for horizontal systems with a machine at either side of the bench—seeing that the description says: "The result of this arrangement is that the operator of each of the two machines proceeds with his work without regard to the opposite end of the retort." If this be so, and the lid on the producer side cannot be released until that on the charging side has been opened, it looks as though (presuming we properly appreciate the method) there may be some waste of time on the discharge side in relieving the retorts of the spent charge, and thus the charging-machine would be kept waiting. The allusion to this matter is found in the Riter-Conley Company's report. For the prevention of the waste of heat from retort-settings, there is a proposal for what is to all intents and purposes an iron-clad structure. A metal casing for the benches is used, and an efficient insulating material is interposed between all parts of the metal casing and the refractory structure of the bench. A mode of utilizing the waste heat from settings is described and illustrated. It consists of a boiler located at the top of a vertical bench; and by its aid the heat of the waste gases from the various settings supplies steam for the pumps and turbines. This is an economy, if there are no disadvantages to set against it. Stand-pipes of rectangular pattern, it is remarked, have been adopted, in at least one case, and are located at the partition walls of the benches, and perform the additional service of acting as buckstays. We should hesitate to demand this dual service, and should prefer buckstays to be buckstays, and nothing more. There is also an instance of a hydraulic main being situated in a cellar.

These are mostly structural and working novelties. What we are concerned to know, by working data, is something as to their actual value. But this is where the report does not render any assistance; and therefore its usefulness is limited. Perhaps in a future report information regarding the value of these innovations may be given from daily working experience. Coincidently with these interesting developments in detail, we notice that silica material is having very large vogue in retort-bench work in the United States, and that the Woodall-Duckham and Glover West systems of continuous vertical retorts have obtained there a substantial footing among the newer installations of carbonizing plant.

The Supersession of Old Rules and Customs.

EXEMPLIFICATION of the change that has come over the gas industry of late years is found in the Presidential Address of Mr. F. J. Ward, of Knowle, to the Midland Junior Association last Saturday. Old rules and custom in working have, through the changes, been superseded by new—to the advantage of the gas industry generally. The new conditions, among other things, as is pointed out in the address, have affected very materially the relations of capital and plant requirement to output. This is largely due to the raising of the day and summer load, and to the increased production of gas per ton of coal; and these changes have been of inestimable benefit to the industry. A low capital account per unit of gas sale affects very considerably the financial conditions of an undertaking and the price at which gas can be supplied to the consumers. The increased make per retort, and the lifting of the day and summer load curves, have also changed the rule in regard to the amount of carbonizing plant requisite in relation to annual production; and all the other plant has been raised in earning capacity. So much to the good; but we may expect that this condition will be again modified when the period of high peak load is once more felt in the winter, through the increasing use of gas-fires. We have not the slightest doubt that the heating load (*plus* lighting requirement) in the winter will gradually attain to the position of the dominating factor in the matter of the determination of the amount of gas-producing plant that will be required; and then any rule as to plant capacity which is in use at present, and has superseded the old one, will again have to be altered.

In another way there is plenty of room for the modification of custom, and that is as to the adoption of a more complete basis for the passing of judgment on, or the making of comparison with, working results and the efficiency of a gas manager. Mr. Ward rightly protests against the narrow basis of judgment all too frequently adopted. He is not the first so to protest. Others (we among them) have called attention to this matter often before. Make per ton, without taking into account all the circumstances—from the quality of coal, quality and composition of gas, and qualities and quantities of other products, and details as to the type and efficiency of plant—all have their bearings. It is a pity the matter of formulating a proper basis of comparison is not taken in hand, not only in regard to coal quality and quality and composition of production, but in respect of working costs and description of plant used. But though efforts have been made in the past to realize a basis, it appears to be a matter beneath the notice of the Institution; and so custom is pursued—every engineer having his own basis, and often being conscious that there are other details that should be brought into the reckoning in order to tell the full and true tale. A cognate question raised by the

President is as to the purchase of coals. This, too, is a point to which reference has been made on previous occasions. A man who is worthy the name of a gas manager would, as a matter of course, study the question of the purchase of coal which is going to give him the largest return per ton, governed, of course, by the quality of product that he has to supply. It is not always, considering geographical position in relation to coal sources, the coal that will give the highest yield of gas that is the most economical or profitable. But Mr. Ward would have the gas manager, when deliberating over coal purchases, make a reasonable forecast of the probable course of the markets for residuals. "Before making any purchases," he says, "the probable "state of the coke, tar, and liquor markets for the period "covered by the contract should be carefully considered, "and coals selected which produce the maximum of the "particular products for which the highest prices are likely "to be obtained." But contracts for coals are, as a rule, made two or three months before deliveries are to commence; and sometimes, when the market is particularly favourable, still longer ahead. When, too, there is, in the opinion of a manager, a likelihood of coal prices moving upwards, coal contracts are often entered into for a term of years. Under such circumstances, there is not much chance of forecasting the probabilities in the residuals markets; and experience of recent years in these markets has shown us how rapid may be the break in demand and price, and how perverse are modern conditions in relation to the application of old rules. Who among gas managers would have predicted that, after the national coal strike of 1912, when they were well confident that coal prices would increase, the market value of coke would simultaneously decline in the sheer manner it did? Markets for our commodities are nowadays exposed to so many current external influences, that the presaging of their trend becomes a difficult matter indeed. But, at the same time, it is the duty of a manager to use his best judgment; and that is what most of them do—at any rate, all who are not engaged in deepening a never varying rut.

The remainder of the address was largely directed to works topics, in regard to some of which discussion would show a large divergence of opinion. Dealing with vertical and horizontal retorts, Mr. Ward, among his other points, holds that filled horizontals produce much better coke than "most" verticals. "Most" is a saving term. The partisans of intermittent verticals would dispute the contention so far as the physical characteristics of coke are concerned; and the partisans of continuous verticals would point to the comparative freedom from moisture of their coke production. Dogmatic statement bereft of qualification is always dangerous when the product of each of different systems has some merit peculiar to itself. Again, the President does not find any use for such appendages of the retort-bench as governors and tar-towers. Perhaps not on his limited scale of working at Knowle; but other engineers on a larger scale of working do. For works of the Knowle calibre, Mr. Ward is making large flight in contemplating the adoption of a high-speed fan type of exhauster; and we are afraid his aspirations in this direction are doomed to disappointment. He is, for his output, it also seems to us, going in for a rather elaborate system of washing, to reduce his ammonia down to "perhaps" 2 grains per 100 cubic feet. The adoption of four washers, he admits, will considerably increase his back-pressure. There is likewise no question that the use of four washers on such a small make of gas will remove a large quantity of carbonic acid, sulphuretted hydrogen, and sulphur compounds; and "possibly," with four washers in use, the life of the contents of the purifiers will be "never-"ending." But the sulphur will be lost; and this has a market value. It may, of course, be of small account at Knowle. It would, however, be a bad thing if all the oxide employed at gas-works had a never-ending life, on account both of the recovery of sulphur and the vendors of oxide of iron for purification purposes. Despite points over which there may be differences of opinion, the address is of good type, and admirable for the expression of the opinions of an independent observer and worker, which Mr. Ward undoubtedly is.

The Long Eaton Council Accept Defeat.

The wisest thing the Long Eaton District Council have yet done with regard to their flagrant breach of the law in connection with electricity charges has been to decide not to appeal to the House of Lords, but to "pay the piper," rearrange their tariffs on a legal basis, and try to behave themselves in future. But those chiefly responsible for the ridiculous position the Council have been placed in could not leave the matter without making a further exposure of their folly. A report was presented, at the meeting of the Council last week, which was intended to be a sort of justification for their ill-advised proceedings. After the Lower Court and then the Court of Appeal, the councillors in question do not [as will be seen from the report in our "Miscellaneous News"] yet appear to fully appreciate what the judgment really means. The Courts did not in any way hold that the circular was "illegal" because the effect of the condition of charge regarding which complaint was made was "to oust competition with the Gas Company." What the Court did hold was that to give one power consumer because he also used electricity wholly for lighting a preference over another power consumer who did not use electricity for lighting, but whose circumstances as a power consumer were similar (and whose circumstances as a power consumer might be even better), was illegal. It is clear, too, that the responsible members of the Council are still a little hazy as to what is meant by "under similar circumstances *to a corresponding supply*." We are afraid the clearing-up of the results of this action, and the setting of the Long Eaton tariffs in order, will require some intelligent handling; but the best that we can wish the Council is that they may speedily effect adjustments within the terms of their statutory obligations. If they do not, there is bound to be further trouble.

The "Lancet" Hygienic Tests.

The staff of the "Lancet" laboratories must have found that their obliging offer to submit gas-fires to their new test for hygienic efficiency has brought them a large additional amount of work. Since the offer, several of the principal makers have sent specimens of their new fires; and the result has been in all cases a clean hygienic character, under the very stringent conditions of testing. The Parkinson Stove Company (as will be seen by a short article elsewhere) have submitted to the "Lancet" fires which have passed through the critical ordeal; and new patterns from the works of the Davis Gas-Stove Company have also passed with a perfectly clean certificate. All this is to the benefit of the gas industry, and to the credit of those who persistently worked for obtaining in the construction of fires the observation by the makers of the new standard of hygienic efficiency.

Sliding-Scale Revision.

There is no question that there is a defect, from the point of view of share and stock holders, in the sliding-scale of price and dividend as applied to statutory gas companies. It makes no provision for unusual circumstances. Attention was called, in an editorial article on the 3rd inst., to the altogether unprecedented conditions which are at the present time obsessing the gas industry owing to the war, and which will without doubt in many cases necessitate the raising of the price of gas, and thus the lowering of the dividend, and the consequent depreciation of the attractiveness of gas stocks as an investment, just when, in order to tempt investors, the very best complexion possible will be required by new issues of capital. For this reason, we suggested the promotion of measures to obtain the consent of Parliament to the raising of the price of gas to an extent necessitated by the extraordinary conditions, without varying the dividend. Now, in our "Correspondence" columns, Mr. J. Kelly, of Bridlington, points to the desirability of a fundamental alteration in the sliding-scale by making provision for a standard price of coal, the exceeding of which price should enable a gas company to raise the charge for gas without reducing the dividend. This is a matter which requires to be thoroughly discussed, before pronouncing any definite opinion upon it.

Considerations and Difficulties.

We see no real objection to the proposal *per se*; it only seems fair under the circumstances that the sliding-scale was evolved at a time when the economic conditions of the gas industry were of an altogether different order from those now prevailing. The price of coal, for instance, is never likely to recede to old-time figures—it will now always be higher under the freshly developed conditions. In every way, in fact, the "cost of living" for gas undertakings has largely increased since the time the sliding-scale was

formulated; and certain, too, it is the industry has fallen upon bad times in relation to coal and residual products. But it would never do to seriously complicate the sliding-scale; and we cannot imagine Parliament being so benevolent as to allow a standard figure above which the price of coal might go without affecting the dividend unless they at the same time looked after the consumers, and ensured that, in the times of lower coal prices, they obtained some compensating advantage. Another difficulty in fixing a standard coal price is that prices of coal delivered vary so considerably according to quality and the geographical relation of works to coalfield. No gas undertaking requires to be bound to one quality of coal nor to one source of supply. Perhaps Mr. Kelly's object could be achieved in some other way—by a neutral zone of gas price and dividend, or by a slight permanent increase in the standard dividend. But generally the proposition presents a very difficult problem, which, justifiable as is the question of re-adjustment of the sliding-scale to current conditions, requires very full discussion before coming to any determination on the subject. In the Act of the Alliance and Dublin Consumers' Gas Company passed a few sessions ago, a coal clause of the kind suggested was inserted, operative for a limited term of years. Some of the contracts, too, of the Danish Gas Company provide for the charge for gas being regulated by the price of coal, as will be seen by Sir Corbet Woodall's address to the shareholders at the recent meeting [*ante*, p. 253].

Municipal Finance and Administration.

Even his most determined critics would not complain that Mr. Samuel Hardman, the Elective Auditor of Southport, failed to take his work sufficiently seriously. His report on the finance and administration of the borough for the year ended March 31 last bears the clearest evidence of zeal and industry; and the ratepayers must have a feeling that very little has escaped him. To some, at any rate, of the matters with which he deals there must obviously be another side; but if the bringing of them forward leads to the clearing-up of doubts, the end aimed at will have been satisfactorily attained. The different departments of the Corporation appear to be impartially treated by Mr. Hardman; but naturally he is more severe on some than on others. The electricity undertaking comes in for a large share of attention, mainly owing to the absence of a reserve or depreciation fund. In connection with the gas undertaking, the appointment of a special Coal Buying Committee is recommended; and Mr. Hardman, having read in the "Southport Visitor" the letter, recently quoted in our pages, from Mr. Isaac Carr, says "an independent report on Southport's undertaking by him would be of inestimable advantage; and I recommend one should be procured." The business of the Water Board does not by any means escape its share of criticism; for it is remarked that "we are now paying £18,000 a year more for water than if we had let the water-works alone, or a rate of 9d. in the pound is paid for the privilege of being the owner of our own water-works." The last portion of this interesting report is occupied in discussing the cost of the Corporation's "Omnibus" Act of last year. Of this, it need only be said that it is dealt with even more thoroughly than the other questions which have come under Mr. Hardman's notice. Municipal affairs in Southport are hardly likely to become unbearably dull while Mr. Hardman retains office.

Profits or Surpluses.

A point that is argued in the course of the report is in regard to the Elective Auditor's contention that the "profits" of the trading undertakings of the Corporation should be described as "surpluses," because ratepayers who are owners of the public services cannot make a profit out of themselves. Regarding the community as a whole, it is no doubt correct to say that charging unnecessarily high prices for gas and electricity, and so reducing the rates by the so-called profit, is merely taking out of one pocket and putting in another. But looked at from the individual standpoint, this is, of course, not at all how the matter works out, inasmuch as the rate-relief is not confined to benefiting those of the citizens who have contributed to the making of the profits on the gas and electricity. And even if the people were identically the same, the proportions in which they contributed to the profits would not necessarily—or even probably—be the same as those in which their rates were relieved. This is the real stumbling-block. If the matter were simply and solely an affair of taking money from one pocket and placing it in another, there would be less to be said against the system of allocating trading surpluses to the relief of the rates—though even then it would have its disadvantages. One of these is pointed out by Mr. Hardman, who says that with large trading profits the ratepayers "sacrifice for the sake of appearing to have made such profits the income-tax of 1s. 3d. in the pound to the Inland Revenue, while every shilling belongs to the ratepayers." But, as already pointed out, the matter is not so simple. In a sense, of course, it is "taking out of one pocket and putting it in another"—only, unfortunately, the "one pocket" and the "other" do not invariably belong to the same person. When noticing the business of the Gas Committee occasion is taken to point out that £14,000 of the profit has been allocated to the relief of the rates. Any non-consumers of gas as well as the consumers, who pay rates, come in for a share of this "spoil."

Progress in Toronto.

It is exceedingly gratifying once again to receive a highly satisfactory report of the progress of gas affairs in Toronto. Twelve months ago, a record expansion of business was notified by the Consumers' Gas Company, and now this is followed by another report which states that in the year to Sept. 30 last there was a further increase in the consumption of gas, in the number of consumers, in gross revenue, and in net earnings. These results are all the better when it is borne in mind that they have been achieved in face of strong competition by the electrical interests. The laying in one year of more than 46 miles of mains (a considerable proportion of them 24 and 36 inches in diameter) must have kept the General Manager (Mr. Arthur Hewitt) and his staff busy. In six years the quantity of gas sold has almost doubled; and to cope with a growth of business of these proportions means a lot of hard work for all concerned. But it is the sort of hard work that everyone connected with the Company will be delighted to see continue. A calculation made at the meeting, however, shows that as time goes on the maintenance of so large a rate of increase may present increasing difficulty. Taking an average of five people to a family, the President said, with practically 100,000 gas-meters in use, "it would seem that nearly all Toronto was using gas." This appears to imply a lessening of scope for new business; but it is a remarkable testimony to the efficiency of the Company's organization. Let us hope that the growth in population may be sufficiently rapid to supply the officials with all the propaganda work that they can cope with.

Dye-Stuffs and Colours—A Practical Movement.

A paragraph in the communicated article "Event and Comment" in last week's issue, appeared to indicate colossal difficulty in the way of the establishment of the manufacture of dye stuff and colours in this country commensurate with requirements. Apparently those chiefly concerned in the matter do not see the same gigantic difficulties as an outside observer; inasmuch as important associations and firms engaged in the colour using and producing industries are collaborating with the Government for the establishment of the industry in this country on a large scale, and so ensuring an adequate future supply of dye-stuffs and colours. This is good news for the home producers of tar; and very bad news for Germany. Before a meeting held at the Board of Trade last Tuesday, there was laid a scheme for the formation of a substantial limited company to engage in the business, and with a large capital, the bulk of which would be subscribed by the consumers of dye stuffs and colours. Conditionally on this being done, the Government have indicated their willingness to subscribe a certain proportion of the share capital, and to guarantee the interest on a large debenture issue for a term of years. Preliminary arrangements have now been made to enable the Government to acquire important dye-producing works, so as to form the nucleus of the manufacturing operations of the new company. A small committee representing the trades concerned has been appointed to confer with the Board of Trade, with the view to the elaboration of the scheme.

Mr. J. Pilkington Hunt, an official of the North Cheshire Water Company at Altrincham, has been gazetted Lieutenant of the First Battalion South Staffordshire Regiment, and will leave at once for Plymouth. Mr. Hunt served through the South African war with the Imperial Yeomanry, and received the King's medal and a special award for bravery.

THE GAS INDUSTRY AND THE WAR.

Under the heading of "Optimism and War," a long letter by Mr. J. H. Balfour Browne, K.C., appeared in the "Dumfries and Galloway Standard" for last Saturday. The writer submits that the prevalence of optimism in regard to the success of the Allies in the existing conflict is "standing in the way of the recruiting of the second million of men who ought to be preparing for the long and inveterate war which is before us." He deprecates this optimism, surveys the whole position, and concludes as follows: "We have been proud of our voluntaryism in the Army. We have boasted that the men who fight for our country are men who fight of their own good will and pleasure. We have compared our willing army with the coerced troops of Continental nations. But is this arm going to fail us through the over-confidence of the people that their own exertions are not required, and that they can remain in comfort at home while our small but heroic Army is battling against overwhelming odds—are 'baffled to fight better'? If it does, there is only one thing left, and that is conscription. But now is the time to show that this is unnecessary. We want every man who is eligible to enlist. . . . My last word must be the same as my first: More men; we must have more men."

When the war broke out the "Intercolonial Gas Journal of Canada," in an editorial, expressed the opinion that gas men would be as loyal as the men of any other industry. According to the November issue of our contemporary, this has proved to be the case. Already 68 employees of the Toronto Consumers' Gas Company are in England with the first contingent. The families of these men will each receive an allowance from the Company of $25 per month while the head of the family is serving his country. This is indeed a generous way of showing patriotism. Besides the men will regain their positions upon their return. Further than this, the Company have organized, in connection with the home defence movement, a "Gas Company Rifle Association." Nearly 400 of the employees have joined. The Company have secured the use of the grounds of nine schools in the city for drill purposes.

A message through Reuter's Agency from Venice, dated last Saturday, states that Vienna, Buda Pesth, and other large cities and towns in Austria-Hungary, are beginning to reduce the public lighting, since the productive capacity of the electric lighting and gas works has been seriously affected by the war. The coal supplies have been greatly diminished; and the production of the oil fields in Northern Galicia is entirely stopped. Even should the Russians be driven out, many months must elapse before oil can again be obtained. The stocks of American and Russian machine oil, which is absolutely necessary for the operation of modern high-pressure electrical plant, are nearly exhausted; and it is impossible to replenish them at present. The gas-works are suffering less than the electric lighting plants, which may ultimately be forced to cease the public supply and furnish power to private consumers only at greatly enhanced rates.

Under the heading of "They Left him his Gas-Meter," the "Daily Sketch" last Friday published a photograph of a totally wrecked house, with these remarks: "When the owner of this house in Belgium returns to search the ruins of his home, he will be able to turn on the gas. The gas-meter was the only thing left standing after the German shell fire."

Alderman J. M. Frost, J.P., Mayor of Chester, and Chairman of the Chester United Gas Company, has received from his son, Lieutenant T. L. Frost, of the Cheshire Regiment, who is at the front, a letter in which he says: "For the last three successive days the Brigadier of our brigade has complimented the Regiment on the work it has done. The story cannot be told yet. The Brigadier has been congratulated on the work done by his brigade; and I think you will all know now the important part played by the 5th Division and the 2nd Army Corps lately. It makes me very proud to be serving in the 22nd Regiment (the Cheshires)." It will, perhaps, be recollected that Lieutenant Frost was reported among the "missing" a few weeks ago; but subsequently Alderman Frost received a telegram from the War Office stating that his son had rejoined for duty. Mr. Frost, it should be added, has three sons serving with the forces.

From a report prepared for the Executive Committee of the National Union of Gas Workers and General Labourers, it is found that, on Sept. 26, 7571 members were wholly unemployed and 31,401 partially employed; while 14,495 members had been withdrawn from civil life for some form of national service.

The Smethwick Gas Committee have decided to supply, free of charge, gas and coke to Smethwick Hall and Warley Abbey, during their occupation by the Belgian refugees. It seems, however, that Warley Abbey being in the area of Birmingham it was necessary for the Smethwick Committee to negotiate with the city authorities in regard to the supply of gas. Satisfactory arrangements have now been completed. Birmingham is quite willing to allow Smethwick to have the gas at a reduced rate; and the responsibility for payment will be undertaken by the Smethwick Gas Department.

PERSONAL.

On the next page of the "JOURNAL," reference is made to the retirement, after many years' service, of Mr. E. W. BROWNING, the Inspector-in-Charge of the districts attached to the Westminster office of the Gas Light and Coke Company. He is succeeded by Mr. E. PILBROW.

It was reported in the "Journal für Gasbeleuchtung" for Aug. 15 [recently to hand] that the honorary degree of Doctor of Engineering has been conferred on Sir WILLIAM H. LINDLEY by the Grand Ducal Technical College at Darmstadt, in recognition of his original work, of a practical and scientific character.

A vacancy having been caused by death on the Cardiff Education Committee, Mr. GEORGE CLARRY, the General Manager and Secretary of the Cardiff Gas Company, was chosen to fill it. At the meeting of the Committee last Friday, Mr. Clarry was welcomed by the Chairman (Dr. J. J. E. Biggs), who referred to the practical interest always taken in technical education by the new member.

In the "JOURNAL" for the 3rd inst., a paragraph appeared mentioning the position that Mr. HAROLD W. WOODALL, of Bournemouth, is occupying in the military service of the Empire. It should have been stated that he is Captain in the Fourth Dorset Regiment, attached to the Staff of Brigadier-General Elliott, who is in command of one of the Brigades of the South-Western Division.

Mr. STANLEY B. JOHNSON left England on Saturday to take up his appointment as Assistant-Manager of the Colombo Gas and Water Company. Before leaving for Ceylon, Mr. Johnson (who has been with Mr. John Young at the Hull works of the British Gaslight Company) wrote to point out that he is a graduate of the Institution of Mechanical Engineers, a silver and bronze medallist in "Gas Manufacture," and holder of several other science and engineering certificates. He was chief lecturer on "Gas Engineering" and "Gas Supply" for the evening classes of the Hull Technical College, and in March last read a paper on "Electricity: Notes and Experiences," before the Yorkshire Junior Gas Association, at Leeds University.

OBITUARY.

The death, in action, is reported in the "Journal für Gasbeleuchtung of Herr RICHARD SLOMKA, the technical assistant at the gas and water works of the Corporation of Myslowitz, in Upper Silesia. Deceased was sergeant in a line regiment.

The death occurred on Sunday, the 8th inst., of Mr. WILLIAM LEWIS GALLOWAY, at the Lawn, Timperley. The deceased gentleman had been a Director of the Stretford Gas Company since 1889, and was Chairman from the year 1897 to 1911 inclusive. He was also during the greater part of this time Chairman of the North Cheshire Water Company. The funeral took place at the Manchester Crematorium; and the large attendance included the following representatives of the Stretford Gas Company: Mr. W. A. Nicholls, Chairman; Messrs. E. Hibbert and T. Lunt, Directors; Mr. H. Kendrick, Engineer and Manager; Mr. W. Blundell, Secretary; Mr. David Smith, Auditor; and Mr. G. C. Adams, Solicitor. Mr. Galloway was in his 83rd year, and had taken an active part in the work of the Company until the last. He was taken suddenly ill at St. John's Church, Bowdon, on Sunday, the 8th inst., and passed away immediately after returning home. Members of the Manchester District Institution of Gas Engineers will remember that they were welcomed by Mr. Galloway when they visited the works of the Stretford Gas Company, in 1910, during Mr. Kendrick's presidency.

We regret to record the sudden death, last Tuesday, at his residence in Kensington, in his seventieth year, of Mr. EDWARD BAYZAND ELLINGTON, who was formerly associated with Sir Corbet Woodall, D.Sc., in the business of hydraulic engineers carried on at Palace Chambers, Westminster. Mr. Ellington was seized with illness some months ago; but he partly recovered, and it was hoped that he might regain his health. Deceased was very widely known and respected by engineers, and regarded with affection by all who knew him well. He was elected a member of the Institution of Mechanical Engineers in 1875, and was President in 1911-1912. He was admitted into the Institution of Civil Engineers in 1882, was a member of the Council, and had been awarded the Watt Medal and the Telford Premium. He was a recognized authority on all matters connected with hydraulic engineering. He founded the General Hydraulic Power Company in 1882, and was the Chief Engineer; he was also Chairman of the Hydraulic Engineering Company, Limited, of Chester. Mr. Ellington, it may be remembered, was selected by the Institution of Mechanical Engineers to deliver the first Thomas Hawksley Memorial Lecture, which had been founded by Mr. Charles Hawksley; and some extracts from it were given in the "JOURNAL" for the 7th of July last. It is a melancholy circumstance in connection with this lecture that Mr. W. B. Bryan, who had prepared the second of the series, died suddenly, within a few days of the date fixed for its delivery. Mr. Ellington's funeral took place on Saturday last; the interment being preceded by a memorial service at St. George's, Campden Hill.

PRESENTATION TO ALDERMAN HENRY HART.

THE distinguished public service, extending over half-a-century, rendered to Canterbury by Alderman Henry Hart, the Chairman of the Gas and Water Company, was recognized at the conclusion of the appointment of the civic dignitaries for the present year on Monday last week, by the unveiling, by the Mayor (Alderman Godden) of a portrait in oils by Mr. A. F. Palmer, which has been presented to him by his brother aldermen and councillors and his fellow-citizens as a slight token of their esteem. In the course of his remarks prior to performing the ceremony, the Mayor briefly sketched Alderman Hart's career. He was first elected as a member of the Council in 1861, seven years later he was made an Alderman, and in the following two years in succession he filled the office of Mayor—a position he occupied again in 1900. For many years he held the chairmanship of the Asylums and Rate and Finance Committees, and was a Magistrate for both the city and the county. On the completion of 48 years' municipal service, he was presented with the freedom of the city. All this good work, said the Mayor, in conclusion, had been thoroughly appreciated by Alderman Hart's fellow-citizens; and the subscriptions for the testimonial to him had come from rich and poor and from every grade of society. Alderman Bennett-Goldney expressed his pleasure in supporting all the Mayor's remarks. Alderman Hart had, he said, for 53 long—and he thought he might add golden—years served the city with faithful devotion and unselfish loyalty, and earned their warmest thanks. The Mayor then unveiled the portrait, which occupied an elevated position on the wall of the Guildhall; and, in formally making the presentation, said he did so with the heartiest wishes, not only of those who had been able to subscribe, but of every man and woman in the city. Alderman Hart, on rising to acknowledge the gift, was obviously touched by the whole-heartedness of his reception. He said he accepted the portrait with the greatest pleasure; but it would be more grateful to his feelings if donors would receive it back from his hands and place it on any wall which they might select in the city. In conclusion, he said that he hoped to be spared a little longer in order that he might devote the remaining portion of his life and give the benefit of his experience to the work of the Committees and to the city. The Mayor accepted the picture on behalf of the Council, and promised that it should be hung in a place where people could see it, so that they might recognize the services the Alderman had rendered to Canterbury.

RETIREMENT OF MR. E. W. BROWNING.

Presentations by the Gas Light and Coke Company's Staff.

IN the "JOURNAL" for the 10th of March last, we noticed two presentations made to Mr. E. W. Browning, the Inspector-in-Charge of the districts attached to the Westminster office of the Gas Light and Coke Company, on the occasion of the completion by him of fifty years' continuous connection with the Company. We learn from the "Co-Partners' Magazine" that Mr. Browning has now retired, and that before doing so his co-workers at Westminster assembled to bid him "good-bye," and to present to him a writing-table and other gifts as tokens of their friendship and esteem. The presentation was made by the Controller of Gas Sales (Mr. F. W. Goodenough), who spoke in the highest terms of Mr. Browning's services to the Company, and felicitated him upon his well-deserved retirement. He said: "No man has ever earned retirement, recreation, and repose more than Mr. Browning has done; and I only hope that when each of us comes to lay down his work and take up his enjoyment at the end of life, it will be possible to say of each of us that we have done as well in our work as Mr. Browning has done in his." He added that they were sorry to lose him officially, but were glad to know that he would continue always a friend to them all, and would carry with him into his retirement their most affectionate wishes for his long life and for his good health for very many years. Mr. Browning thanked Mr. Goodenough for his kind words, and said he was proud to have served under such a chief. He also thanked the donors for their gifts, and for their spontaneous expressions of affection and good will towards him. Mr. Browning was the recipient of many other presents, comprising a silver-mounted umbrella and gold-mounted briar pipe from the foremen and fitters attached to the Westminster office (including the brass shop).

Mr. Browning was Chairman of the Committee of the Company's Inspectors-in-Charge—a position that he had held from its inception. On the occasion of his presiding for the last time, his successor in the chair (Mr. Holt) presented him with a suit-case, as a mark of the members' esteem. In doing so he referred to the excellent influence Mr. Browning had always had over the proceedings of the Committee, who wished him to carry into his retirement the happiest feelings of their association with him. The members also presented Mrs. Browning with a cheese and biscuit dish. In acknowledging the gifts, Mr. Browning referred to the whole-hearted support he had always received from the Committee, and assured them that his feelings towards them were of the warmest possible character.

In view of Mr. Browning's long connection with the Gas Light and Coke Company, it may be of interest to give the following particulars of his life-work. At the date of his retirement (Oct. 1), he was the officer with the longest record with the Company, having entered their service as a lad in March, 1863. He was at the Westminster office for 40½ years, and had charge of their West-end district. At one time he supplied thirty theatres and music-halls with gas. For the last 11¼ years he was Inspector-in-Charge of the Westminster office division, controlling the business in an area containing upwards of 88,000 consumers; the staff of inspectors, clerks, and fitters, &c., numbering about 400. For several years he had planned, designed, and carried out the model kitchen for the Cookery and Food Association at the Horticultural Hall, and was practically the originator of the "live" gas shows. On his retirement, the Council of the Association, as a mark of their appreciation of his services, elected him an honorary member, and presented him with a case of silver-mounted pipes.

As already mentioned in the "JOURNAL," Mr. Browning is an active Freemason. He occupies "London Rank," is Senior P.M. and Treasurer of the St. Martin's Lodge, No. 2455, and a P.Z. and Scribe E of the Mount Edgcumbe Chapter, No. 1446. We heartily congratulate him on his long record of service with the important Company from whose ranks he has now withdrawn, and join with his former colleagues as well as his personal friends in wishing him many years of health and enjoyment in his retirement.

ELECTRICITY SUPPLY MEMORANDA.

THE London County Council are much like the Kaiser and his satellites. The latter entertain the modest view that their destiny is that of omnipotent rulers of the world; the County Council encourage the belief that they ought to have the supreme government of not only the electricity supply of London but of the surrounding territory. Other county councils, borough councils, and company undertakings have their contrary opinions on the subject. They have no particular desire to have their electrical enterprise swallowed up by the London central authority. It is thought by some people that the electrical "Kultur" of the hostile authorities is defective, and that they must be brought to their senses. The argument against them is that they do not know, or they will not admit, that concentration of generation means the salvation of all things electrical, and that expediency demands it. Further than this they cannot see, or they will not see, that the proposals of the County Council are going to give cheaper electricity to their communities. On the contrary, they prefer to go on with the control of their own affairs electrical, and believe they can do as well as the London County Council in the area within which the Legislature has given them jurisdictive powers. For the moment at all events, we cannot blame them. The London County Council have not yet advanced a single atom of evidence to show that certain of the areas which they propose to take under their wing will be in any way bettered in regard to their electrical supply. The Council, however, intend to make an attempt, *viâ* Parliament, to break through all this opposition to the reaching of their Paris or their Calais. A cumbrous scheme has been built up, containing ingredients selected for the purpose of reconciling to it the divers and diverse interests concerned. A new authority, it will be remembered, is to be created for the purpose of the concentration. For the time being, it is to be optional whether existing undertakings fall into line; but a controlling power over the capital expenditure of those who do not is, according to the plan, to be conferred upon the authority. The authority are to lease the central undertaking to a company, who are to find an agreed portion of the capital, not a pre-stipulated part as at first contemplated. A controlling power is to be vested in the authority, who are to be supplemented by a body of paid technical advisers. It is a remarkable scheme; and we do not wonder that the cumbrous and complicated machinery is not attractive to the existing suppliers. But the Council are going forward. They are prepared to take the risk of defeat. They are not particularly confident of success; and it is thought, if the signs of defeat are detected, that they can retreat before the whole of the estimated parliamentary expenditure is incurred. It is calculated that £17,000 will cover the costs. The Council are going to ask for five years' grace during which they will have the option of proceeding at any time with the scheme. If the parliamentary application is successful, it is estimated that, in the first five years, the capital expenditure will be 5 millions, and afterwards at the rate of 1 million per annum. How many millions will be sunk by, in combination, the new authority, their technical advisers, and the leaseholders is a matter that is buried in the unknown future. Of course, if no company comes forward to take up the scheme, it will have to be dropped. On the whole, we shall not be surprised if this proposal simply turns out to be another flash in the metropolitan electrical pan. After the flash, there will be further quietude for a period.

The L.C.C. Concentration Scheme.

Generation, Concentration, and Bulk Supply.

Sir John Snell, in his Presidential Address to the Institution of Electrical Engineers, has not given satisfaction to everybody. The comments on the address form a curious mixture. Some of the commentators think he is eminently practical and rightly optimistic; others, that he is reactionary. The critics look at the man and his words

from the point of view of their own preferences and preachings; and if he does not fall squarely into this point of view, things are not well with him. Only on two points are there any serious differences of opinion—they are as to bulk supply, and charges for electric current. But before Sir John came to these, he dealt with a few other subjects, among them defending the dissolution of the Industrial Committee of the Institution, advocating the setting up of an Advisory Committee in its place, and counselling the electrical contractors to cease their hostility to the Wiring and Fittings Bill of the Municipal Association, and to give it their support—he, taking a detached and dispassionate view of the situation, believing that the Bill, if placed on the Statute Book, would be of advantage to the electrical contractors as well as to the whole industry. The contractors claim to know their own business best, and to have had a fairly extended experience of municipal electrical departments and their tactics. However, these matters by the way. Sir John is not prepared to swallow large concentration and bulk supply schemes as in all cases, under the circumstances of the electrical supply of the country to-day, the proper routes for progressive development. But he draws no hard-and-fast line. If the country were starting *de novo* in electricity supply, with current accrued experience to guide it, concentration would for many suitable districts be the politic thing. But critical examination fails the President in finding where, generally speaking, local supplies would now benefit from concentration or a bulk supply; and he has come to the conclusion that, in the majority of cases, local undertakings will not merge into larger aud widely distributed systems, because where there exist modern and properly managed concerns, no economy could be shown. It is clear from what he says, and what Sir Alexander Kennedy said some time since, and others have said in like strain, that among the top brains of the industry there is a pretty strong difference of opinion upon this subject of concentration, and verily the support of statistics is on their side. Given a wisely managed local station where the capital has not been redeemed or written-off, unless energy could be given by a bulk supply undertaking at rates not exceeding £2 10s. per kilowatt of maximum demand and 0·25d. per unit delivered for untransformed high-tension energy, there would be no economy. With a new undertaking near a bulk supply, and suitable terms, the proposition would be the right one to be entertained. To show that he views the matter impartially, Sir John suggests that a survey should be made by the Local Government Board of the present position of every electrical authority, so that the Board might be in a position to judge whether economy would issue in any individual case from patronage of bulk supply or the sanctioning of loans for extensions of existing plant. If each undertaking were only subjected to a one-man survey, and the Board exercised an arbitrary power in the matter upon the survey, there would soon be clamour and dispute galore, in the midst of which would be the Board. The London County Council are hardly likely to retain the new President of the Institution for the support of their electricity concentration scheme for London.

Sensational Prices for Domestic Supply.

Domestic supply and prices had part in the address. Long Eaton was no doubt lurking somewhere at the back of Sir John Snell's mind. He gave evidence in defence of the undue preference shown in that case; and it did not realize a verdict for the District Council. This by the way. Sir John is an optimist of the first water in regard to the part that electricity is going to take in domestic service, though here, again, local circumstances will control the degree of success. He thinks, too, that the assessment system of charging and the fixed rate system will have growing application; and that domestic electric appliances will be produced at cheaper prices. So far so good. These are personal opinions based on hope, mixed with a relatively small quantity of hard-won experience against an economically applied competitor. Then came another rub for those ultraists who prattle about current being supplied for domestic purposes, at some distant period, at ¼d. or ⅛d. per unit. It is unwise, says Sir John, to speak loosely of "sensational" figures like these, unless there is considerable evidence to support them. He cannot find any evidence. Looking the world over, they are very exceptional cases that can out-distance the average prices for all supplies charged in this country—1·56d. per unit taking the country generally, and 2·15d. taking London alone; the average, of course, being obtained from the extremes of low prices for railway, traction, and power services and the high flat-rates for domestic lighting. "I do not know," said the President, "of any other country that can show as good figures, except in one or two instances of exceedingly large supplies to railway and traction systems."

An Ideal Case.

Even an ideal case which Sir John assumes for illustration purposes does not support the brag of some folks as to the cost at which domestic electricity is going to be supplied in the future; and concentrated ideal conditions of the kind are as rare as the Koh-i-noor. The case is one of generation on a large scale from power stations dependent on fuel transmission to various parts of an extended province—partly by overhead lines, partly by high-tension cables—the transmission pressure being over 30,000 volts. The case also supposes supply to transportation systems (railways and traction), wide classes of industries, and domestic supply of an extended order. Possibly the load factor might reach 50 per cent. Huge generating sets and inexpensive buildings might be erected for £8 per kilowatt installed. Then—under, be it marked, these ideal conditions—the generating costs per unit delivered to the high-tension feeders would *probably* not exceed 0·2d., including all capital charges on the power station only; but the average cost per unit sold, including 5 per cent. interest on capital and adequate depreciation, would be 0·54d. This means that prices such as the following properly assessed charges would have to be made to consumers of various kinds, allowing for a reasonable diversity factor:—

Class of Supply.	Consumers' Annual Load Factor.	Average Proper Price to be Charged.	Probable Future Tariffs.
	Per Cent.	d.	
Lighting	12·5–15	1·200	1½d. (domestic)
Heating and cooking	40–45	0·447	½d. (average rate, ¾d.)
Power	20	0·77	¾d. to ½d.
	25	0·64	
	30	0·554	
Public lighting	35	0·493	½d.
Special power (mills)	40–80	0·447 to 0·286	½d. to 0·3d.
Special non-peak loads	..	Down to 0·15d.*	..

* According to load factor and other circumstances.

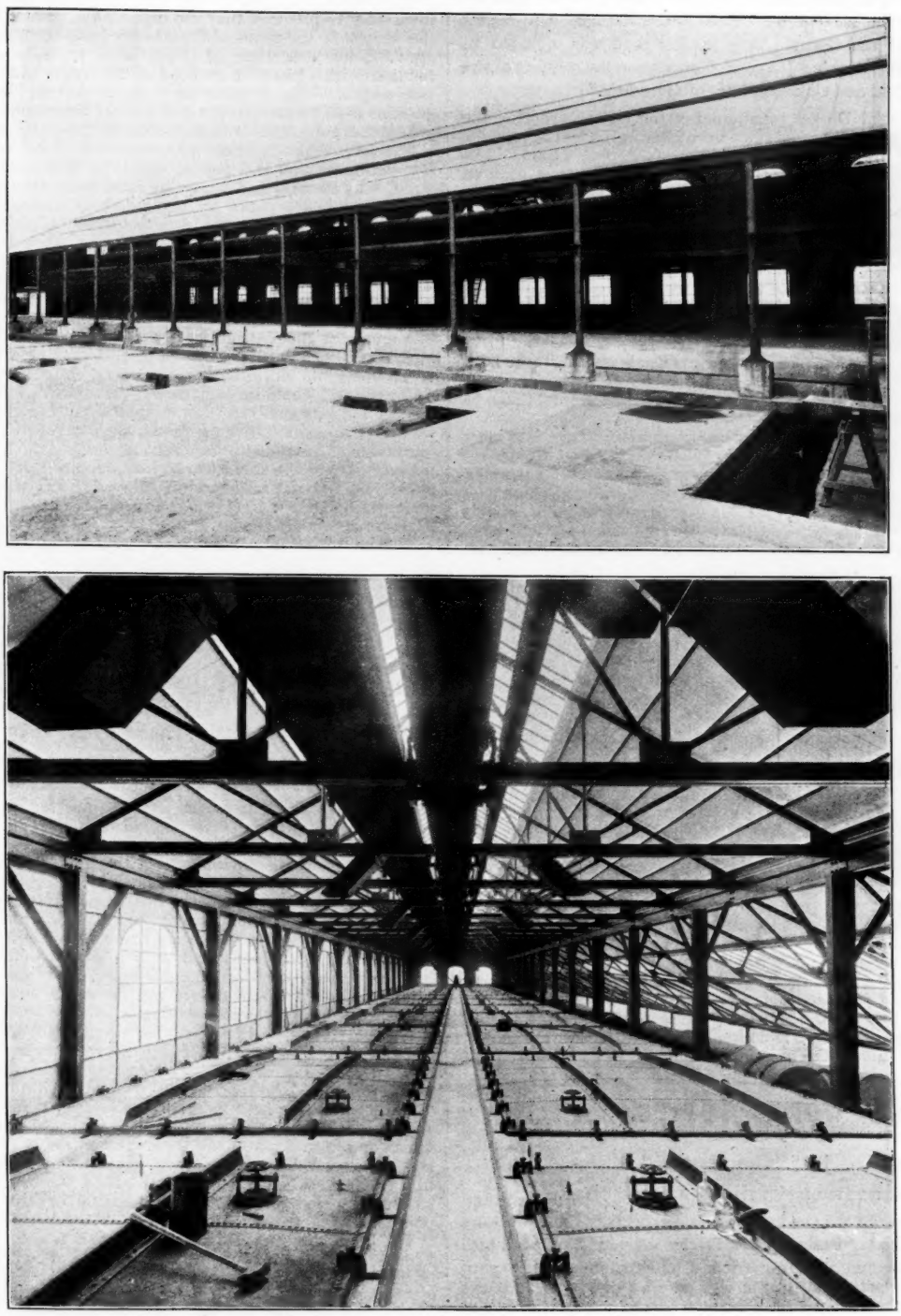
An analysis of these estimated costs of production shows that they are apportioned as follows: Generation (fuel 25·4 per cent., and other generating costs 4·3 per cent.), 29·7 per cent.; distribution, 9·8 per cent.; management, rates and taxes, &c., 13·1 per cent.; capital charges, 47·4 per cent. The two principal items of costs are, therefore, fuel and capital charges. Sir John then imagines (this can only exist in the imagination) some system of generation by which the cost of coal could be eliminated—such as the sale of bye-products, "which would balance the coal cost." The average cost of 0·54d. would only be reduced to 0·40d.; and the average charges to lighting consumers would still have to be 1½d., while industrial consumers with ordinary load factors would have to pay prices ranging from 0·66d. to ½d. if the costs were properly apportioned. Therefore, as Sir John says, it is most unwise to talk about giving a general supply at ⅛d., or even ¼d. per unit. It is easily demonstrated that such figures are unattainable by any known methods, or from any developments which seem to be within the region of possibility. Those who foolishly speak of such figures are just those who have never made a study of the matter. But the President has had to do so. He has had to do so at Long Eaton and at Southampton; and at the latter place he has advised a departure from the flat-rate of ½d. for cooking and heating to the fixed annual payment, *plus* ¼d. per unit.

Differences at Sheffield.

As to the point the President made regarding the electrical contractors giving their support to the Bill of the Municipal Association, even were they to do this, trouble would not cease, for they are not likely to give up the sale of fittings, and have only the wiring left to them. What would happen is illustrated by what has happened at Sheffield. It will be remembered that the Corporation Electricity Committee were defeated in the Chancery Division in an action brought against them for acting *ultra vires* in the matter of trading in wiring and fittings. They also looked very much like losing the Bill they promoted in Parliament in the 1912 session; but, almost at the twelfth hour, they came to an agreement with the contractors in order to save the measure. Ever since there has been constant bickering, and alternative proposals as to future conduct have been passing from the one to the other. The contractors say the Corporation ought not to do this or that, in view of the "honourable" agreement entered into with them. The Electricity Committee say they have the right. The contractors want the Corporation to have show-rooms containing samples only of fittings, and to do no business whatever in the way of selling them. The department, on the other hand, desire to sell fittings, and let the purchaser declare the name of the contractor through whom he, in imagination, makes the purchase. The department would then inform the contractor that they had sold a fitting or fittings on his behalf. The Corporation would receive payment from the purchaser, and pay to the lucky contractor a proportion of the profit obtained, reserving a goodly part for themselves. This seems a circuitous way of conducting business; and it is hardly likely the contractors, who do not want to share the profits with the Corporation, will willingly agree to the idea.

External Corrosion of Cast-Iron Pipes.—In a communication to the Proceedings of the American Society of Civil Engineers [No. 40; 1914] Mr. M. R. Pugh deals at some length with the above-named subject. According to an abstract of the article in the "Journal of the Society of Chemical Industry," the author gives examples from France, England, and the United States of the great durability of cast-iron piping, and also of piping which deteriorated rapidly in from seven to twenty years, when laid in saline soils or in sea water. The causes conducing to and inhibiting corrosion are discussed, and details of typical cases of corrosion are given with photographs and analyses. The remedies recommended are increasing the natural resistance of the skin of the cast iron, surrounding the piping with lime or cement, laying in an open trench or above ground, and galvanizing the pipes.

NEW PURIFIER HOUSE AT THE POOLE GAS-WORKS.



THE NEW PURIFIER HOUSE AT THE POOLE WORKS OF THE BOURNEMOUTH GAS AND WATER COMPANY.

[*Hazel, Photographer, Bournemouth and Salisbury.*]

We have received from Mr. Philip G. G. Moon, the Acting General Manager of the Bournemouth Gas and Water Company, two photographs of the new purifier house at Poole, together with a short description which Captain Harold W. Woodall had intended to send to the "Journal" at the time he received his Commission. They are reproduced herewith, and will certainly prove of interest to our readers.

The installation is one of six luteless purifiers, each 40 feet by 30 feet, recently erected at Poole by Messrs. Edward Cockey and Sons, of Frome. The purifiers are formed by two continuous vessels, each 120 feet by 30 feet, and divided into three by division plates. Each box has four luteless covers, each 13 ft. 6 in. by 16 ft. 6 in.; and the purifiers are worked by Milbourne valves, supplied by Messrs. C. & W. Walker.

The oxide is raised by means of a bucket elevator from the ground level, and is delivered into a rubber and canvas belt-conveyor running the whole length of the house. From the conveyor the oxide is distributed into the various boxes by means of fixed shoots attached to the roof principals, and portable shoots carried on the travelling hand-crane which is used to lift the covers, and which runs on rails fixed to the tops of the boxes. The oxide is discharged by gravity into a telpher conveyor running underneath the purifiers, and passes through a disintegrator before being delivered on to the revivifying floor.

Five of the boxes are fitted with "hurdle" grids supplied by Messrs. Hawley and Co. and one with "Milbel" grids supplied by Messrs. C. & W. Walker.

The purifier shed is constructed of ferro-concrete on the "Hy-rib" system, with a wood roof, covered with ruberoid. This work was carried out by Messrs. Vale and Sons, of Stourport.

The ground in the neighbourhood is all very soft; and to save much excavation, the whole installation is "floated" on a reinforced raft, 2 ft. 6 in. thick. The total distributed load is 750 tons, and no movement has taken place since the raft has been loaded.

THE STATE OF THE GERMAN COKE MARKET.

The market report contained in the last number received of the "Journal für Gasbeleuchtung" gives later information in regard to the state of the German coke market than was included in the article in last week's "Journal" (p. 287) on the "Effect of the War on the Coal and Coke Supplies of Germany."

The Ministerial Decree mentioned in the article, ordering the greater use of oven coke, has since been interpreted less rigorously, on account of the representations of the gas-works. Nevertheless the decree has caused great interruptions in the sale of coke on many gas-works; and the market conditions for gas coke in many parts of Germany are still very unfavourable.

Silesia is suffering specially, owing to the complete stoppage of export to Russian Poland, which in times of peace takes large quantities of coke. Also Galician firms are not purchasing; and while some improvement in this quarter is anticipated, no great expansion in the sale of coke in Upper and Lower Silesia is yet expected. The stocks on gas-works in this district are still large, and the gas production has, on the whole, been reduced but little. The export of coke to Austria-Hungary has been interrupted for a long time, owing to the unfavourable conditions for goods traffic, and the greater part of the coke which would in normal times be sent there has to be stacked.

In the Province of Posen, on the other hand, there is a large sale for coke, though the quantity available is equal to the requirements. In East and West Prussia there has been a stronger demand in the last few weeks, except in the areas which had suffered directly from the war. The supply of waggons in this district leaves much to be desired. In Pomerania and Mecklenburg business also has improved; the gas coke being mainly required for central heating plants.

In Schleswig-Holstein and the North Sea coast generally the demand for gas coke has increased considerably. Many works which in ordinary times export the greater part of their make have in the course of the last few weeks got rid of their large stocks locally. The special rates introduced for the conveyance of coke to the Baltic Sea ports, with a view to favouring export to northern countries, have not yet had any considerable effect.

In Thuringia and Saxony the coke market has been bad, and stocks are accumulating. If much colder weather ensues shortly, it is anticipated that the demand for coke will show a great improvement. There is little demand for coke for Bohemia.

In Bavaria the coke market has improved, and both from there and Westphalia some business has been done with Italy. Now that this business has recommenced, it is anticipated that considerable quantities will be sold to Italy from Central Germany also. In West and South Germany the demand for coke has become quite vigorous, and there is a fear that when cold weather ensues the supply will not cope with the demand, especially as the consumption of gas, and consequently the production of gas coke, has diminished by about 20 per cent. The irregularity in the supply of waggons and in the traffic conditions makes it likely that in the near future the demand will be greater than the production. The prospects of gas-works in these districts are favourable. Switzerland and Italy are becoming increasing purchasers, as industry there is flourishing better than was originally anticipated would be the case in war time.

WORKS TOPICS.

By "Modus Operandi."

Institution Meetings—A Suggestion.

Many members of the gas industry, and especially those who are members of the Institution of Gas Engineers, must have read with interest the account of the American Gas Institute meeting, published in the last issue of the "Journal" (p. 291). Here was adopted for the first time a scheme whereby a large number of interesting subjects could be introduced and discussed in the course of the few days during which the meeting is prolonged. The advantages are so palpable that the opportunity is taken to refer briefly to them in this column, in the hope that our own Institution will give consideration to the adoption of a somewhat similar plan.

At the American Gas Institute meeting no less than 34 papers were read—divided into five sections, consisting of the manufacturing, chemical, distribution, accounts, and illumination sections. Thus it was possible for all members to attend the sections where the subject under discussion was of particular interest to them individually; and in the same way they could vary their attendance among the different sections in accordance with a published programme which showed the times of reading the various papers. By this means the meeting was made of much greater interest and profit to the members generally; for we are told that "as a result of the endeavour to cover various phases of the industry the combined attendance at the different sections exceeded 500—being perhaps 200 larger than could be found at the old sessions, where the Institute met in one body, and where, therefore, at any one time only a portion of the hearers were especially interested in the proceedings."

There is no doubt the adoption of a similar scheme by our own Institution would be warmly welcomed by the members. Under present arrangement only two or three of the six or seven papers read are likely to be of very particular interest to an individual; and yet when these papers are finally read and discussed time is invariably so precious that the man who is competent to discuss the subject to the profit of the members and the industry is either crowded-out altogether, or is permitted to make a few hurried remarks with a pistol at his head in the shape of the President's stop-watch. This is necessary at the present time if the programme is to be completed; but it is far from right, and is every year criticized in the strongest terms by the members.

If, however, the excellent plan instituted at the American meeting were adopted, the papers could be increased to (say) the number of twenty, and plenty of time could be left for the full discussion of each paper by any members who are interested in particular subjects. It would be a further advantage that more members would be given the privilege of reading a paper. Considering there are more than 800 members, it is easily realized that very few, under present arrangements, will ever be given the opportunity of contributing a paper to the Institution.

It is not suggested that the sections should be similarly divided in the case of our Institution. In any case, the subject of "Illumination" could well be included with that of "Distribution." It is doubtful, too, whether a section devoted exclusively to "Chemistry" would be sufficiently patronized. It is certain that the sections devoted to "Manufacturing" and "Distribution" would be very well attended; while a special section dealing with questions of administration, accounts, legislation, and general matters of policy would also be very popular. In fact, the case would be met quite adequately by the adoption of three sections under the headings: (*a*) Manufacturing, (*b*) Distribution, (*c*) Administration and management.

The alteration in policy which would be necessary to change the present—it must be admitted—unsatisfactory method of conducting the annual Institution meeting, would need much preliminary discussion; so that it is hoped that this suggestion, at the present juncture, may be regarded as worthy of consideration.

THE "LANCET" HYGIENIC TESTS FOR GAS-FIRES.

[From the "Lancet" Nov. 14.]

It seems to be agreed in the practical gas-fire industry that the requirements we have laid down in regard to the escape of combustion products from the gas-fire into the room should be complied with. If it were not so, there would not have been so many applications to us to apply the hygienic test to new models of fires; and it seems certain that the test has been very generally adopted. At all events, it is rarely now that the models sent to us show any defect in this respect; and we have little doubt that the fires are submitted to the test by the makers themselves at the factory before they reach us. The present winter season, therefore, opens well with a supply of gas-fires which have passed a test of hygienic efficiency. We are sure that the establishment of this standard will do much to make this convenient means of domestic heating popular.

Another series of gas-fires was recently submitted to us for testing purposes by the Parkinson Stove Company, Limited, of 129, High Holborn, W.C. The description of the models was as follows: No. 1950 "Congreve," No. 1931 "Ratcliffe," No. 1933 "Ratcliffe," No. 1942 "Edmund," No. 1721 "Pathan," and No. 1732 "Spartan." These were all well designed and attractively finished fires, and not one of them showed the slightest escape of combustion products either when tested in the open, unattached to a chimney, or when unprovided with a flue or elbow. We regard these fires, therefore, as being satisfactory from the hygienic point of view.

We have also received from the Davis Gas-Stove Company, Limited, of Luton, and 60, Oxford Street, London, W., four types of their new barless gas-fires, named as follows: "Apollo," "Venus," "Neptune," and "Cupid." These all bear evidence of careful construction, specially directed to securing hygienic conditions of working. These makers introduced the hygienic test known as the "Shadowgraph" test, so that they took the initiative in excluding gas-fires which did not satisfy this test. In other words, they commenced the movement for condemning gas-fires which allowed combustion products to escape into the room. Under these circumstances, it seemed superfluous to test their own models. However, it is interesting to record that the "Lancet" hygienic test was found to confirm the findings of the Shadowgraph test, the standard which they adopted. There was no leakage of combustion products from these gas-fires even when unaided by an elbow or lengths of flue-pipe. The complete passage of the combustion products through the flue nozzle was demonstrated, and the process is automatic. The firm is much to be congratulated on its pioneer work.

The Birmingham Gas Department Benevolent Fund Committee, operating at the Windsor Street works, have sent a donation of ten guineas to the fund which has been opened for the relief of distress in Belgium consequent upon the war. This sum is in addition to the handsome weekly contributions of the Gas Department employees to the Prince of Wales's fund.

A "SAFETY" RADIATOR FOR MOTOR GARAGES.

THE enterprise of gas-stove manufacturers in overcoming difficulties and surmounting objections to various forms of gas apparatus has been generally satisfactory to the gas industry. The question of radiators, when required for use in places where explosive gases may be found, has, however, always been rather a troublesome one to solve. Excellent as radiators are for many purposes, it was necessary to design something which was absolutely safe for use, particularly in motor garages, where danger might arise from the presence of petrol vapour. This need has now been met by the "Safety" radiator introduced by the Davis Gas-Stove Company, and shown in the accompanying illustration. It belongs to the steamless type brought out by them; and it is claimed that it is absolutely safe for use under all conditions. This contention is supported by the result of severe tests carried out by the Company themselves, and inspected by insurance authorities. In the tests referred to, a special testing apartment was constructed, in which the radiator was placed and allowed to burn in an atmosphere that contained varying percentages of petrol vapour and at other times coal gas. Tests were also made by pouring liquid petrol on the floor of the apartment, and even on the stove itself. These tests were carried out when the main heating-burners were alight, and also when the pilot-lights only were in use. In spite of every effort, it was found impossible to make the flames in the radiator ignite the inflammable gases or vapours in the air of the apartment.

The "Safety" radiator is constructed in accordance with the well-known principles embodied in the Davy miner's lamp, in which a wire gauze or other suitable screen is used to prevent the flame within it from igniting the combustible gas or vapour outside. The radiator consists mainly of a cast-iron base. Mounted upon it are the heating columns through which pass the hot gases of combustion; suitable outlets being provided at the upper ends of the columns. The gas is led through gas-tight joints to a series of burners within the base; one burner being situated beneath each of the columns. Each burner is also provided with a pilot-light, which is left on when the main heating-burner is extinguished. Air to support the combustion of the gas is allowed to enter the base by way of a series of double gauzed inlets. These are protected by suitable cast-iron screens, which render impossible the ignition of inflammable vapour outside the radiator. At the top of the columns special cast-iron screens are provided in the form of a series of narrow slots, which prevent the possibility of ignition at this point. It will thus be seen that the gas is completely burnt within an enclosed space which is effectively protected by suitable screens against the presence of a surrounding atmosphere impregnated with coal gas or other inflammable vapour. On the base of the radiator, in front of each burner, is situated a brass plug, provided with a glass centre through which the flame is readily visible. This plug is also used for lighting-up if the gas has been extinguished, as, for example, during the summer months, when the radiator is out of use.

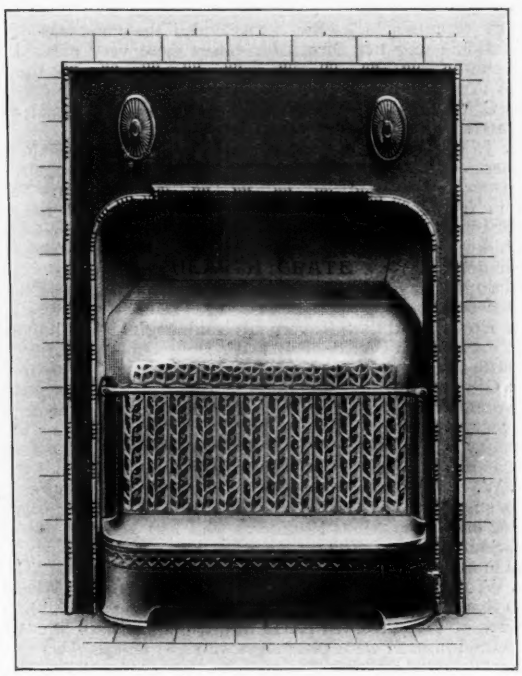
ARDEN HILL AND CO.'S NEW GAS-FIRES.

THIS firm have recently issued an attractive catalogue of their gas-fires for the present season. The outstanding feature of their policy in relation to the manufacture of gas-fires is "the combination of efficient hygienic heating with perfect room ventilation;" and the excellent results attained have only been realized by arduous and consistent research work in the laboratories.

As a proof of the hygienic quality of their gas-fires, they point to the fact that a representative group of four—the "Gnome," "Olak," "Kalo," and "Loka"—were submitted on July 11 to the stringent chemical test of the "Lancet," and all the fires were pronounced by our medical contemporary to be at all points hygienically perfect.*

There still, however, remained the question of ventilation, which required to be adequately grappled with in connection with gas-fire construction, so as to remove every difficulty in the way of the adoption of gas-fire heating as an effective substitute for the coal-fire. The firm now claim that this difficulty has been completely overcome by the new "injector-ventilating" gas-fire principle which forms so prominent a feature of their programme. Such great importance do they attach to this new "injector-ventilating" principle that they have now applied it to their "Gnome" fire, and also to a new and tastefully designed fire—the "Hygeia;" and there seems good reason to expect that the fine designs of these fires will lead to their continued popularity throughout the season.

For the numerous body of gas consumers who would be pleased to instal a gas-fire, but who already have a fine coal-grate in use which they do not wish to supersede, Messrs. Arden Hill and Co. offer their new "Frame" fire, which, unlike the ordinary basket type of fire, does not clash with the surrounding grate, as when once placed in position, apart from its comfort, it never would be noticed. This effect is attained without sacrificing the radiant and hygienic efficiencies of the gas-fire itself. The fire illustrated is shown fitted into an ordinary coal-grate; and, as will be seen,



The "Eagle" Hearth Grate.

it appears to be an integral part of the grate. A special feature is the concealment within the fender of all piping, &c., with the exception of a small tap which controls the gas supply. These fires are made to fit grates with openings from 12 to 22 inches in width (inclusive), and they can be supplied with a side boiling-burner and also with a nickel-plated trivet if desired. This "Frame" fire is neat and compact, and should prove invaluable for the purpose for which it is intended.

The improvements introduced in the fires this season, combined with their general excellence in design and construction, make the firm's winter programme one that will appeal to gas undertakings desirous of stimulating the demand for gas-fires.

* See "JOURNAL," Vol. CXXVII., p. 93.

The Gas Institution Benevolent Fund.

It may be remembered that at the recent meeting of the contributors to the Benevolent Fund of the Institution of Gas Engineers, some discussion took place as to what steps could be taken to increase the amount of the funds at the disposal of the Committee, who have lately had so many calls upon them. Mr. Edward Allen, the immediate Past-President of the Institution, expressed the opinion that a circular sent by the Chairman (Mr. John Bond) to non-subscribing members of the Institution would have a good effect; and he submitted a proposition to this effect, which was agreed to. Mr. Bond has accordingly had the circular sent out. He sets forth the urgent need of new subscribers to the fund; the income of the Committee having suffered owing to the deaths of some of the subscribers. Appended to the circular are some particulars of the circumstances of those to whom grants have been made, as showing the beneficent nature of the work which is being done by means of the contributions placed at the disposal of the Committee. A perusal of these will, we are sure, help to emphasize the special appeal now being made, which is addressed not only to non-subscribing members of the Institution, but also to the Presidents and Secretaries of the District Associations, in the hope that the question may be brought before these bodies. We trust the result of the appeal may be a substantial increase in the amount of the fund.

SOUTHERN DISTRICT ASSOCIATION.

THE General Meeting of the Association was held last Thursday, at the Hotel Cecil, Strand, W.C.—the PRESIDENT (Mr. Thomas Glover, of Norwich) in the chair. There was an excellent attendance of members. Prior to the meeting, tea was served, and an interesting hour spent in social intercourse.

Assembling in an adjoining room, the business on the *agenda* was at once taken in hand.

MINUTES CONFIRMED.

On the suggestion of the PRESIDENT, the minutes were taken as read, and confirmed.

OFFICE-BEARERS FOR 1915.

The PRESIDENT said his next pleasurable duty was to propose his successor in the chair. The gentleman he was going to name was well known to the members; and of his services to the gas industry, they were also well aware. Cambridge was a most hospitable University centre; and those of them who lived in the Eastern Counties had often experienced the goodness of Mr. Auchterlonie and his Directors. They were very pleased that Mr. Auchterlonie was willing to serve the Association in the position of President for the coming year.

Mr. C. W. OFFORD (Tottenham) seconded the motion; and it was carried with much heartiness.

Mr. J. W. AUCHTERLONIE (Cambridge) said he thanked the members cordially for electing him to the presidential chair. He also especially thanked Mr. Glover for the kind words he had used in nominating him. He was very sensible of the great honour the members had done him. He did not, however, think he could maintain the high level that previous Presidents of the Association had set; but he could assure the members that he would do his very best to hand on the high office untarnished to his successors.

Mr. EDWARD ALLEN (Liverpool) said he had the honour to nominate as Vice-President Mr. W. Doig Gibb. He need say very little to commend the motion to the members. The abilities of Mr. Gibb had brought him into the front rank of the profession; and, in nominating him, they not only desired to have the services of a very able man as an official with the ultimate view to the occupancy of the chair of the Association, but they also desired, as far as it was in their power, to put honour upon him.

Mr. W. N. WESTLAKE (Exeter), in seconding the motion, said he was sure Mr. Doig Gibb would in time add another name to the long list of illustrious Presidents who had adorned the chair of the Southern Association.

The motion was cordially passed.

Mr. W. DOIG GIBB (South Metropolitan Gas Company) said he had to thank the members very much for having elected him to the office of Vice-President. He hoped that, as both Mr. Auchterlonie and himself were gentlemen who had travelled south, the members would not get fed up too much with their peculiar northern ideas [Laughter]; but he was sure Mr. Auchterlonie and himself would be animated by one desire during their years of office, and that would be to see how much good and thoughtful work they could do to forward the interests of the Association.

Mr. F. W. CROSS (Lea Bridge) said he had to move the election of Mr. W. E. Price as a member of the Committee. He was sure the old members of the Committee, as well as the present ones, knew and felt that Mr. Price was in his right place as a member of the Committee.

Mr. ARTHUR VALON (London), in seconding, remarked that Mr. Price was rather more than a simple member of the Association; he was an institution.

The motion was heartily carried.

Mr. PRICE having returned thanks,

Mr. C. F. FRANKS proposed the election of Mr. G. M. Gill as a member of the Committee. Mr. Gill, he said, held a responsible position with the Commercial Gas Company; and he was sure he would be a valuable member of the Committee.

Mr. W. B. FARQUHAR (Ilford) seconded the motion; and it was unanimously carried.

Mr. FRANK LIVESEY (Maidstone) had much pleasure in proposing the re-election of Mr. H. C. Head as Hon. Secretary and Treasurer. The Association were extremely fortunate in their selection of Hon. Secretary, from whom they asked a good deal. It was important that he should possess thoroughly good organizing capacity. Mr. Head was all that was desired in this and other respects.

Mr. P. DREWETT (Fareham) seconded the motion; and the PRESIDENT supported it, with the remark that Mr. Head kept together everything that was good in the Association.

The motion was cordially agreed to.

The HON. SECRETARY, in acknowledging his re-election, said he had very great diffidence in taking the position; but he had much less diffidence since they had elected Mr. Price to the Committee, as in him he had a guide, philosopher, and friend, to keep him straight.

Mr. PRICE proposed the re-election of the Honorary Auditors, Messrs. James L. Chapman and Alexander Dougall, as well as Mr. A. F. Browne, as Hon. Auditor of the Commercial Section.

Mr. T. H. NIXON seconded the motion; and it was unanimously passed.

Mr. BROWNE, on behalf of the Auditors of the Association and himself, acknowledged the confidence of the members.

NEW MEMBERS.

The PRESIDENT submitted the names of two new members who were recommended by the Committee for election: Mr. Cyril M. Croft, one of the Assistants of the Wandsworth, Wimbledon, and Epsom Gas Company, and Mr. Frederick G. Matthews, of the Chertsey Gas-Works.

The members cordially approved the additions to the roll.

ANNUAL REPORT OF THE COMMERCIAL SECTION.

The HON. SECRETARY then presented the annual report of the Committee of the Commercial Section, and, as Chairman of the section, moved its adoption. The text is as follows:

The Committee have pleasure in presenting their fifth annual report of the section, for the twelve months ended Sept. 30, 1914.

Membership.—Six additional companies became members, and two resigned; the total membership now being 62.

General Meetings.—Ten general meetings have been held during the year—the average attendance being fourteen members.

Coal.—Coal prospects in the early part of the year 1914 were more favourable than during the preceding year; and contracts were made at reduced prices. But the war, in which this country became involved at the beginning of August, disorganized the trade of the country. Since then, however, coal has been coming forward with more or less regularity—in the case of rail borne coal, without extra cost; but in the case of sea borne coal, carried through the North Sea, at an extra cost of about 1s. 6d. per ton, which the companies as consumers have been asked to pay. Some contractors have, however, met the companies in a liberal manner, and have agreed to continue supplies, the company paying an additional 1s. per ton only.

Coke.—With reduction in the price of coal, there was a marked falling off in the demand for coke; and big stocks have been accumulated by the London companies and other large producers. This has had a very adverse effect on market prices, which fell considerably more than would appear to be warranted by the amount of the reduction in the price of coal. No increased demand has been occasioned by the war, owing to house coal continuing to be delivered freely.

Tar.—The outstanding feature of the tar market is the action of the distillers in the northern portion of England, who, on the ground that the war has entirely stopped the export of pitch, said that they could only accept delivery of the tar under the contracts provided the companies would accept the value of the liquor products less distillers' working expenses and profits, leaving payment for the pitch until such time as it should be marketed and paid for. A meeting of representatives of the Institution of Gas Engineers and the Commercial Sections considered these proposals; and at the meeting a Sub-Committee was appointed to meet the tar distillers and report.

Sulphate of Ammonia.—During the year, the sulphate of ammonia market has considerably weakened; and with the outbreak of war business practically ceased. Prices obtainable now are the lowest recorded for some years.

British Commercial Gas Association.—This splendidly organized institution has spared no effort in bringing to the notice of the general public the innumerable uses to which gas may be applied, by advertising, lectures, and placing their staff at the disposal of all inquirers. To enable them to still further advance in this direction, a great amount of additional financial support is essential, more especially on behalf of those undertakings not already subscribing to the funds, who are at present reaping the benefits of the campaign without assisting in the financial department, without which the success anticipated cannot be attained. The Committee of this section feels it behoves them to influence as far as possible the splendid work being carried out to the whole gas world, and wish to impress upon our members that personal influence among non-subscribing undertakings may, in some instances, bring about the desired aim.

Other Topics Discussed during the year included: Apprenticing boys to gas-fitters; hire fitting and slot-meter charges; proposed Association of Sulphate of Ammonia Manufacturers; workmen's compensation insurances; guarding of gas-works, &c. Much valuable information was disseminated. The Committee is satisfied that the monthly meetings, at which matters of commercial interest to the various companies are discussed in an informal manner, are of great value to the companies and to their business representatives; and they express the hope that the meetings in the future will be well attended. Only one meeting has been held since the war was declared; but this meeting was a record one as far as attendance was concerned, and the exchange of information as to deliveries of raw material, and what was being done in various parts of the district undoubtedly helped many members.

General.—A very marked increase of interest is noticed in Commercial Section organization; and new sections have been formed in other districts, the membership of which is very satisfactory. This tends to prove the advantage gained by companies in taking up membership. Whilst our number of members is most satisfactory, the Committee hopes that during the coming season many more neighbouring companies will join.

Signed on behalf of the Committee,
H. C. HEAD, *Chairman.*
R. SEYMOUR TOBEY, *Hon Secretary.*

October, 1914.

Mr. P. P. CHANNON (Haywards Heath), in seconding the motion, said that his Company, though a small one, felt a very great gain

in many ways, especially with reference to coke and sulphate of ammonia sales, through their association with the Commercial Section. He did not care to pin himself down to an exact figure; but he might say that they realized about 1s. per ton more for their coke, owing to the information received from the Commercial Section, and the facilities they had through it for the interchange of information regarding the coke market. The same applied to tar and sulphate. Considering these points alone, membership of the section was well worth going in for on the part of any gas undertaking.

Mr. D. H. HELPS (Reading) asked whether the Commercial Section was working in conjunction with the Sulphate of Ammonia Association.

Mr. HEAD, in reply, said at the present moment the Commercial Section was not officially working with the Sulphate of Ammonia Association. A great many of the members of the Commercial Section were members of the Sulphate of Ammonia Association; and information was mentioned at the Commercial Section meetings. While there was no official connection at present, he hoped that it would come later on. The Sulphate of Ammonia Association, as a commercial body, was quite a new thing; and it was hardly on its legs as yet. When it was, he knew the Commercial Sections would welcome it, and do all they could to work with it. Emphasizing Mr. Channon's remarks as to the economic advantages of the section, he should like to mention that the subscription to it was only half-a-guinea for works up to a make of 50 million cubic feet, and one guinea for works beyond this make. It was a perfectly insignificant subscription; and he was sure the interchange of ideas that took place at the monthly meetings paid the undertakings for the small expense they were put to.

The motion was unanimously carried.

EDUCATION OF GAS-FITTERS.

The HON. SECRETARY said, as the members would remember a Committee was appointed at the last meeting to deal with this question. They had held three meetings, and now presented the following report:

Education of Gas-Fitters.

Members are reminded that, at the end of 1913, a long letter was received from the Secretary of the Institution of Gas Engineers in this matter. The letter was considered by the Committee and at the general meeting held in March last.

A Sub-Committee, composed of Messrs. Glover, Paterson, Doig Gibb, Westlake, Auchterlonie, and the Hon. Secretary, was appointed; and after the Committee had met a circular-letter was sent on Sept. 1 to the members in the various towns throughout the Southern district asking certain questions.

A large number of replies have been received, and a *précis* of them has been considered by the Committee. From them it is learned that classes in gas-fitting have been, or will be, started in the following towns:—

Westminster,	Guildford,	Kingston-on-Thames,
East Ham,	Portsmouth,	Brighton,
Reading,	Acton,	Exeter,
Croydon,	Enfield,	Aldershot.

But in many quarters there is a feeling that the present time is not opportune to start such classes, and that the whole matter would be better left over until more settled times.

The information as to the classes has been communicated to the Secretary of the Institution of Gas Engineers.

On Sept. 22 last, Sir Philip Magnus wrote that he understood from Mr. Dunn that our District Association had kindly undertaken the preparation of a panel containing the names and addresses of gentlemen who would be willing to act as Local Examiners, should their services be required, and asking that the panel may be forwarded to him so that the gentlemen whose names appear thereon may receive a copy of the circular-letter of instructions, which are confidential.

Up to the present time, no panel has been formed, though various suggestions from members of the Committee have been considered.

Concluding the reading of the report, the HON. SECRETARY moved its adoption.

Mr. S. GLOVER (St. Helens) seconded the motion, with considerable pleasure. From the initiation of this important subject, they had been hearing a great deal about it; and it was with gratification that he heard of the number of classes that had been formed and were at work, as a result of the stimulus that had come from various sources. He was glad to hear that there was promise of further classes being organized.

Mr. EDWARD ALLEN (Liverpool), while hearing with pleasure that so many classes had been formed, said it was to be regretted that there were not more of them. He ventured to make this the important point of his remarks. There were a great many undertakings represented there that day, and there were many important ones in the large district covered by the Association. The Gas Light and Coke Company and the South Metropolitan Gas Company were both doing a great deal in this direction. But there was need for them all to do something. The way they were pushing the adoption of gas-stoves of various sorts had helped very much to the prosperity of the gas business; but they had all been hindered very much for lack of good gas-fitters. The plumbers in the country looked with a great deal of jealousy on this effort on the part of gas undertakings to bring up well-trained gas-fitters. They had an idea that they alone should handle piping of all sorts. The plumber expected that the gas-fitter should not, for instance, touch water-pipes. To deal with water-pipes, they said, was the plumber's business. The weight that they attached to the wiped joint would seem to make it necessary that the gas-fitter should first do his part of the work, and then wait for the plumber to do a job which would only take the fitter perhaps half-an-hour, and which the plumber would probably take half-a-day over. The labour members of some town councils had made it their business to oppose this question of the education of the gas-fitter, because, they said, it was unfair that there should be any trespass on the important business of the plumbers. In Liverpool, the members of the Technical Education Committee were sensible men; and they withstood the very strong attitude taken up by the labour members of the City Council. He had heard that in some towns, classes had not been commenced because of this opposition. But he thought, despite opposition, gas engineers should do their best to go on with the scheme. The plumbers were the worst men they could get for their particular purpose. They pointed out that they were registered plumbers, and held certificates; but they did not understand gas appliances. Gas undertakings were not merely in existence to make and distribute gas, but they had also to supply people with the best possible means of obtaining light, heat, hot water, and power. For this work, and to fulfil their obligations to the public, they needed skilled men. He hoped this matter would not be delayed; but that every engineer would get into touch with the Education Committees, and make all preparations to start classes next session. In their gas-fitters' class at Liverpool, they had 42 youths. They were, in their practice in this regard, going much on the lines of the Gas Light and Coke Company. They had the classes and practical work, with a lecture at their Technical School once a week. Everything was going on splendidly. In the matter of gas appliances, he was sure the coming generation would be better served than the past.

Mr. C. F. BOTLEY (Hastings) said they must not overlook the fact that there was a wide divergence between the North and the South of England on this matter. The gentleman who had just spoken had before him the picture of the North; he (Mr. Botley) had not. It should not be thought that those of them who had not put down their names for classes were not doing anything, because this would be a radically wrong impression. In the South of England particularly, they did not have trouble over the question of plumbers *versus* gas-fitters. The matter was not heard of at all. Nor did they, because their names were not down for classes, disregard the education of gas-fitters, Indeed, he was afraid that what was being done was going to make a lot of paper-wise young men who would not be able to use their tools properly. ["No, no."] So far as he was concerned, if a man could not use his tools properly, it was no good his having any paper knowledge. He must first be able to use his tools. Unless they started from this basis, no good would result from the present movement. In Hastings they were fortunately able to train a sufficient number of fitters in the Company's own workshops, and this solved the problem as far as they were concerned.

Mr. H. O. CARR (Wandsworth) said there had been started for the Wandsworth, Wimbledon, and Epsom Gas Company, a class for practical gas-fitting, one for practical main-laying, and, he hoped, they would have a class for practical plumbing, because, as Mr. Allen had indicated, this was now an essential part of the work of a gas-fitter. He quite agreed with Mr. Botley that the training should be first of all of a practical character, seeing that a gas-fitter had to earn his living by his skill. At a later stage, theory might come in; and with regard to this there were now many excellent institutions which would teach the gas-fitter the theoretical side. But as a start, he thought it best to conform in the class to the actual work as near as possible. Holding this view, he was glad to say the opportunity came in his case. The Company had a row of old houses which had to be vacated by the tenants owing to works' enlargement. The houses, however, were not wanted for some time; and therefore it became practicable for them to use the old houses, and educate the gas-fitters in a skilful way. What happened was that outside the houses little mains were started, and then, under the guidance of the best main-layer he could find, the students had to cut, level, and lay pipes, and make joints, and so forth. Beyond this they took the service into the house, fitted up the meter just in the ordinary way, and then there was the fitting work from the meter onwards. The fitting class was taken in hand by one of the best fitters; and pipes were run over the houses, and gas brackets, stoves, and water-heaters were fitted up—all as near as possible as the practical work the men would in the future have to do. He quite supported Mr. Botley's idea that practical work should be done first.

The PRESIDENT said it would remove one or two wrong impressions in the minds of certain members if he reminded them that candidates for examination must have served three years as apprentices at gas-fitting. This settled the question as to whether they were to be paper men or practical men. The training which this Association and other Associations had in mind was not to be instead of practical training, but was to be systematized training in addition to the practical work that the apprentice or young gas-fitter did under the guidance of the older gas-fitter. They made gas-fitters at present by starting boys (say) at 15 or 16 years of age, and putting them alongside or helping a good practical fitter. The "practical man," under whom the apprentice worked, learned his trade through years of hard work by actually doing it, and never studied it theoretically. He learned it by watching someone else do it; he did not know the reasons for doing some of the things, and so he did not know his trade thoroughly. With properly systematized training, the apprentices would be shown how to do things which were only done occasionally, and which they

might miss seeing done if they were only just following their trade in the ordinary way. They would also be taught the reason for things, certain simple calculations as to the flow of gas in pipes, and other matters seen in the schedule. If they looked at the question in this way, there surely could not be any objection to the better training of their apprentices in the art and practice of gas-fitting. With regard to the question of plumbing *versus* gas-fitting, the subject was a different one in the North from what it was in the South. In the North, there was an acute divergence between the plumber and the gas-fitter. The plumber claimed to be a gas-fitter; but he was very anxious a gas-fitter should not be a plumber. They did not want their gas-fitters to be plumbers in the full sense of the term. They did not want them to lead a roof, or do flashing, or certain other acts that plumbers had to do; but they did want them to be able to make a joint when fixing a geyser or hot-water apparatus. They wished them to be able to satisfy the water authority with regard to the making of a good wiped joint. There was no difficulty about it. He had in mind a gas department where lead services were entirely used for gas; and the gas-fitters there were taught to make wiped joints. The same men could lay a water-pipe if necessary to satisfy the water authority. This was the ideal they had to keep in mind; and part of the training of these young gas-fitters would be to completely fix water-heating apparatus without having to call in a plumber. He trusted that all the members would interest themselves in this subject.

Mr. Edward Allen asked to be allowed to supplement his remarks. He had the greatest admiration for work privately done in this direction by various gas undertakings; and he had no doubt Mr. Botley's men were well trained. But the members would remember that this Association and other Associations approached the Institution with the view of getting into touch with the City and Guilds of London Institute for the purpose of having a systematic training of fitters, so that they might get a certificate of competency. A man from Hastings might apply for a job in another town; and he might be asked, "Where is your certificate?" If he could not produce one, he might be at a disadvantage. They must be loyal to the Institution and to the City and Guilds of London Institute, who had helped them in a way which would not have been possible had they acted independently. He desired to get every member to join in this work, and to let their gas-fitters have certificates which they could show the whole world, the same as the certified plumbers.

The report was adopted.

Studies in the Microscopic Examination of Coals.

Mr. Samuel Glover then read a paper on the microscopic examination of coals. The subject was made of great interest and very instructive by the numerous sections of coal shown, prepared both for the microscope and for the lantern. During the exhibition of the lantern slides on the screen and the subsequent microscopical examination, the son of Mr. James Lomax, M.I.M.E., whose work is world-famed among students of the structure and composition of coal, assisted Mr. Glover in pointing out the constituent features of the various sections exhibited. Since the meeting, Mr. Lomax has forwarded some photographs and descriptive particulars that require time for their reproduction. Mr. Glover's paper is, therefore, held over till next week.

At the close of the paper,

The President said it was his duty to ask the members to pass a vote of thanks to his brother for the great amount of trouble he had taken in preparing this lecture, and for the clear explanation he had given as to the formation of coal. It was usual to associate coal with geology; and they had studied to some extent the geology of coal. What they had heard that evening showed them that it was closely allied to a botanical study. They had been learning the botany of coal, and had now a greater amount of information than probably they had heretofore as to the kind of plants, and their fruits, that had entered into the composition of coal, and which had affected its quality. He could not agree with the suggestion that was made that the climatic conditions of the coal period were very similar to those which existed on the earth's surface to-day, certainly not in these northern countries, because these coal-forming plants were only known to them growing in hothouses with moist atmospheres. He thought they might safely assume there were a high temperature and a moist atmosphere when these plants flourished and grew so rapidly, and produced their pods and fruits and the highly carboniferous dust which came into the composition of the coal, and which they were now turning into gas. The sections exhibited to them were wonderful when they remembered that they had been drawing supplies of coal at the rate of 200 million tons a year out of this little country for so many years, and that certain seams kept so constant in quality as they knew they did. They were sometimes reminded that seams of coal varied in quality. After a number of years, it was said that such-and-such seams had degenerated, and were not so good as they used to be. Was it to be wondered at, drawing from the seams as they did, that they did vary a little? The marvel was that growth took place over such huge areas that the seams were so constant as they now usually found them.

Dr. Rudolf Lessing, in seconding the motion, said they must all agree as to the great versatility of Mr. Samuel Glover, which allowed him to jump from a subject as practical as vertical retorts to the minute investigation of a problem as highly scientific as the study of the palaco-botany of coal. It was difficult to discuss a topic such as this, which he was perfectly certain was an entirely novel one for a meeting of gas engineers. The beautiful sections Mr. Glover had shown them would, he thought, bring home to the minds of them all that coal was not the simple mixture that some people imagined. The information and the beautiful slides would, he (Dr. Lessing) was sure, be acceptable to everybody either in the form of a book or in some other publication.

Mr. D. T. Livesey (East Grinstead) remarked that the gentleman to whom Mr. Glover was indebted for these beautiful slides was Mr. James Lomax, whose son was with them that evening. He knew Mr. Lomax some thirty to forty years ago; and it was largely to him that they owed their modern ideas regarding the structure of coal. He thought they should couple with the vote the name of Mr. Lomax.

The President agreed with the suggestion.

The vote was very heartily passed.

Mr. Samuel Glover, in his acknowledgment, said his task had indeed been a pleasant one. He had had the honour of the friendship of Mr. Lomax for only some few months, and had taken up this study as a recreation, remembering that a change of work was as good as a rest. In opening the subject that evening, he did draw attention to the fact that the sections exhibited were the work of Mr. Lomax, in whose laboratories at Bolton had been developed the most successful method of doing such delicate work; and the excellence of the method had enabled floods of light to be thrown on a long-buried and dark subject. Mr. Lomax was absolutely devoted to science for science sake, and truth for truth's sake. Just recently he had been elected as honorary associate member of the Linnean Society. Whatever success might come to him in the future his friend would look upon the work he had been inspired to do as a sort of trust, and would continue to devote his energies to the development of the interesting study. He had succeeded in it beyond what anybody had accomplished before; and his son was one of the most skilful producers of geological and other specimens, and particularly of those relating to the life history and composition of coal.

This concluded the proceedings; but numbers of the members stayed behind to make a microscopical examination of many of the coal sections.

MIDLAND JUNIOR GAS ASSOCIATION.

Opening Meeting of the Session.

The Opening Meeting of the Association for this session was held on Saturday afternoon, in the Technical School, Suffolk Street, Birmingham. The chair was occupied at the beginning of the proceedings by Mr. W. H. Johns, of West Bromwich, the outgoing President; and his place was subsequently taken by Mr. F. J. Ward, of Knowle, the new President.

Association Membership and the Roll of Honour.

The Hon. Secretary (Mr. W. J. Pickering) remarked that it was usual at the first meeting of the Association for the session for some statement to be made with regard to the membership. The number of members at present on the books was 192. All societies this year were meeting more or less under a cloud; but he thought they might well congratulate themselves on the fact that 23 of their members were either in training or else going to the front. [Applause.]

Introducing the New President.

Mr. Johns said the time had now come for him to retire from the office which it had been a pleasure for him to fill during the past twelve months; and he thought that very few words were needed from him to introduce the President-elect. Mr. Ward had, since its inception, always taken a very lively interest in the doings of the Association. Frequently he had had a share in the discussions, and had shown them that he was a man well fitted to occupy the position of President of the Association. He would, however, before asking Mr. Ward to take his new position, like to thank the Council and the Hon. Secretary for the great assistance they had given him during his year of office. They had done everything they possibly could to make the year a success—even more perhaps than usual, because he had been away from Birmingham, and had been prevented from being at the Council meetings as often as he would have liked.

The Past-President Thanked.

Mr. F. J. Ward (who, on taking the presidential chair, was heartily applauded), thanked the members for their reception, and said he felt some diffidence in following his predecessor, who, as they knew, was a host in himself. Mr. Johns' capacity for work was enormous; and he was instrumental in compiling, with the Secretary and Council, a very strong programme for the past year, which was successfully carried out. Though removed from Birmingham, he had kept closely to his work for the Association; and for all that he had done the members were extremely grateful. He (the speaker) asked them to pass a hearty vote of thanks to Mr. Johns for his conduct in the chair during the past year.

Mr. G. C. Pearson, in seconding it, also remarked that the

Association had had a most successful year under Mr. Johns, who had made an excellent President.

The vote having been carried with acclamation,

Mr. Johns returned thanks. He said he had always tried to do his best for the Association, because he realized that the Association had been able to do a lot for him. Any success he had himself attained was, he believed, largely due to the fact that he had taken a lively interest in the Association, and had always availed himself of opportunities of acquiring knowledge. He therefore urged the younger members to do the same. He was sorry to have to resign his membership of the Association; but he hoped they would allow him to come occasionally, and take part in the proceedings, as in the past. He also trusted that some time the members would pay him a visit at West Bromwich.

Mr. Ward then proceeded to deliver the following

INAUGURAL ADDRESS.

Gentlemen,—The circumstances which have prevailed for the past few months, and which are prevailing to-day, render my task of addressing you one of peculiar difficulty; and I am conscious that my shortcomings will be many, owing to the distraction of thought and lack of time and opportunity caused by the lamentable war in which our country is now engaged. Let us hope that peace will shortly ensue—a peace which will be as lasting as the world itself, so that the pursuit of Science can be continued, fresh conquests in the world of research be obtained, and commercial prosperity such as has never heretofore been attained may be general. Of such prosperity our industry would have a good share, for gas is still destined to play a leading part in the world's future.

The immediate effects of the war have not been quite so disadvantageous to our industry as appeared to be probable when hostilities were commenced. Though instances were common, where householders, manufacturers, &c., were forced to exercise the strictest economy—in my own case a normal annual increase in sales of about 10 per cent. was immediately turned into a decrease of like amount—there are now, it is satisfactory to relate, evidences that confidence is becoming more generally restored, that gas sales are reaching former levels, and though we cannot expect that the original state of affairs can be attained while matters remain uncertain, yet we have cause to congratulate ourselves.

Our Association is chiefly composed of young men who are engaged in subordinate positions in the manufacture and distribution of gas. Most of them naturally aspire to higher positions—positions which appear to them to be pinnacles from which the world can be surveyed with complacency and possibly self-consciousness. I have a great regard for men who, by application to study and self-improvement, seek to fit themselves for higher posts, and consequent greater scope for their energies and abilities, than they at present occupy. Before, however, they take up their pens to make application for any position which they desire, it would be well if they searched their hearts and became confidently assured that they were fully capable of undertaking the increased and probably more responsible duties, not only with credit to themselves but to add to the prestige of gas generally. I fear that whenever vacancies occur there is usually a rush of candidates anxious to be the successful ones, a large percentage of whom are unfitted for holding the posts. The requirements of persons filling responsible positions in gas undertakings to-day are so large and varied that only men with undoubted qualities should be appointed. Even if promotion is denied to a large number, it follows, almost as certainly as day follows night, that willing, loyal, and efficient service to their employers is bound to bring increased financial recognition in due time. Every man has not a Marshal's *bâton* in his knapsack, but he can be, if he will, as indispensable to his employers as the person holding the highest position in the service.

PURCHASING COAL.

The matter of the best, and therefore the cheapest, kind of coal to carbonize is one to which gas engineers have to give a large amount of attention. Owing to geographical reasons, it is often a financially unsound policy to use coal which would otherwise be preferable. Before making purchases, the probable state of the coke, tar, and liquor markets for the period covered by the contract should be carefully considered, and coals selected which produce the maximum of the particular products for which the highest prices are likely to be obtained. At the moment of writing, the market for coke is in a very unsatisfactory condition, and signs are wanting that it will improve. Tar and its products are yielding very low prices; while ammoniacal liquor, at present low, is likely to rise to a higher figure than it now yields.

These facts and signs indicate that coal should be purchased, if contracts were now being made, which are high in gas yields, low in coke and tar yields, and high in ammonia yields. Future years, as in the past, may make it necessary for this policy to be departed from; but if care is taken in watching markets and foresight used, considerable financial gains can be made in the proper selection of coal for carbonizing. In the Midland district, the coal which is chiefly used is that from North Wales, South Yorkshire, Derbyshire, and Nottinghamshire; and changes can be rung on the numerous qualities which these fields offer to cause marked differences in the financial results. Taking South Yorkshire alone, the coal raised is of very varying quality—ranging from the most superior to be obtained down to some of the most inferior; and unless previous knowledge by testing is obtained, carbonizers can be easily led astray if the purchases are made incautiously. It may be necessary to drop one's best friends in the coal supplying trade; but this is an episode in the commercial world that cannot be helped.

COMPARISONS OF RESULTS.

Comparisons are sometimes made between gas results produced in gas-works and those in charge of the operations by persons who have that "little knowledge which is a dangerous thing," especially directors and committeemen, and who hastily pass judgment by the amount of gas made per ton of coal carbonized, without ever taking into consideration the particular coal which is being carbonized. Even in the coal raised in the fields indicated above, coal classed as gas making varies under the same treatment as much as 40 per cent. in gas yields. With the best of the Yorkshire coal, 15,000 cubic feet of good quality gas can be produced under modern conditions in horizontal retorts; while some of the Derbyshire or North Wales coals yield but 10,500 cubic feet. A gas engineer may be doing as good work making 10,500 cubic feet per ton out of the coal he is carbonizing as another making a very much larger quantity; the gas in each case being of equal quality and the method of carbonizing the same.

PRODUCTION PER MOUTHPIECE.

The change which has occurred during the past quarter of a century in gas yields and increased summer sales has influenced very considerably the amount of capital required to be expended in retorts for producing the maximum amount of gas required. It was then regarded as a correct course to adopt to provide a mouthpiece for every million cubic feet of gas per annum. The winter peak load is now much less evident—although the increasing use of gas-fires will cause it to increase—and the gas produced per ton of coal is largely in excess of former productions. Consequently, one mouthpiece for 1½ millions is now ample. A works making 300 millions formerly required 300 mouthpieces; but 200 are now sufficient. The maximum output at the Knowle works is 65,000 cubic feet per diem. This amount is being produced by one bed of six retorts, 22 in. by 16 in. by 9 ft.; each retort producing well over 10,000 cubic feet per diem. A quarter of a century ago, probably ten retorts would have been required to produce the same quantity.

VERTICAL V. HORIZONTAL RETORTS.

Vertical systems of retort-setting continue to be improved in their design, methods of working, and results obtained from them. This is satisfactory, as vertical retorts enable carbonization to be carried on under more humane conditions, and without offence to residents in the locality of the works, though they are still not completely satisfactory. Having regard, however, to the increasing number of keen and careful engineers who are responsible for their design and working, the defects are being rapidly remedied; and it will not be long before they will become almost general in works of (say) over 50 millions which have required their carbonizing plant to be extended or renewed. With regard to actual carbonizing results, apart from the foregoing advantages, it is quite a debatable point whether the vertical retort possesses any advantage over the horizontal system. The quantity of gas produced per ton of coal is as much, if not more, in the case of properly-designed and worked horizontals than in the best of the verticals. Horizontals almost filled with coal produce much better coke than most of the verticals; the quantity of tar made is more, and of a better quality; the ammonia returns are quite as satisfactory; while no trouble is experienced from naphthalene formations.

DIP PIPES AND ASCENSION PIPES.

There are a few points in connection with the removal of gas from horizontals into the foul main the proper study of which is of benefit. I have abandoned, so far as can at present be carried out, the use of fixed dip pipes, and have dip pipes which can be used as ordinary dips or clear-ways as desired. The advantages of such a flexible system are considerable. In the ordinary way the retorts are worked free of seal; but if any retort shows signs of weakness it can be placed under the 6-10ths seal which is set, until it is properly sealed-up by carbon, while the other retorts are working free. It is of great importance that no retort should be at all weak, especially if high heats are being worked. The slight pressure at which combustion chambers should be worked is sufficient to cause the ingress into the retorts of an undesirable quantity of producer gas, more or less consumed; and if the combustion is continued in passing through the cracks of the retorts they are quickly enlarged, the life of the retorts shortened, and the gas produced diluted and impaired. Good heats—that is, about 1900° Fahr. in the retorts—and tight retorts are essential to good carbonizing.

Ascension pipes should be larger than is usual—7 inches for single retorts is a good size. Dip pipes, if used, should be larger in the peripheral lower edge, and should be made bell or rectangular shaped, brought to a fine, true outside edge. A 6-inch dip-pipe enlarged at the lower end to rectangular form, 6 in. by 12 in., presents an edge nearly double the ordinary circular dip; and it can be inserted in the hydraulic main through a hole but little larger than the smaller size. The only disadvantage of such dips is that they require a hydraulic main larger in superficial area to form the necessary seal to overcome back-pressure. If, however,

the change in form is made very sharply, the increased size will not require to be much larger than is usual. A large hydraulic main is a distinct advantage, as it forms a condensing chamber, and lighter tars are deposited, which assist in keeping the heavier tar more fluid. The dip-pipes at Knowle are mostly 7½ inches in diameter. In future extensions, however, larger ones will be adopted, as it is quite clear that the greater quantity of gas coming off from a fresh charge placed in a hot retort cannot pass by the dip without causing pressure in the retorts; while towards the end of the period of distillation, should the exhauster be worked at a partial vacuum in the hydraulic main to any appreciable extent, such vacuum is communicated to the retorts, with undesirable results.

RETORT RENEWALS.

I am decidedly of opinion that renewals of retorts should be undertaken oftener than is usual, especially if good heats are being worked. It is unwise to work with faulty retorts. Results are too often sacrificed owing to retorts being unrenewed.

RETORT-HOUSE GOVERNORS AND TAR-TOWERS.

I have never found the necessity of installing such additions to plant as retort-house governors and tar-towers. A good point, however, in retort-house governors is the ability to use them for exhausting air into the main for revivification *in situ* purposes.

Careful attention to the foregoing points should be responsible for better results in carbonizing. For some time past I have fixed a standard to be worked to, of 14,000 cubic feet of gas per ton of coal; the coal being a mixture of one-third first-class, one-third second-class, and one-third third-class Yorkshire. This standard is being exceeded; the make averaging 14,100 cubic feet, and the gas 530 B.Th.U. by 16 candles ("Metropolitan" No. 2). In round figures, from first-class Yorkshire coal 15,000 cubic feet of gas can be obtained; from second-class, 14,000 cubic feet; and from third-class, 13,000 cubic feet.

EXHAUSTERS.

I have of late given considerable thought to the best means of exhausting gas from the retorts, as I have had much trouble from the unsatisfactory working of rotary exhausters. My opinions have long been that the rotary exhauster was not such an efficient machine as ought to be fulfilling the duties, and I felt that a machine of the high-speed fan type was preferable. I was therefore much interested in perusing the account given by Mr. John Foster, the Engineer of the Windsor Street Gas-Works, Birmingham, in the "JOURNAL OF GAS LIGHTING" for Feb. 10 last, of a high-speed fan-type exhauster, made by the British Thomson-Houston Company, which he had installed at his works, and which was working extremely well. As I shall shortly be adding to my exhausting machinery, I have been in communication with the Company and other makers of similar plant; but so far I have been unable to induce them to make an exhauster smaller than 10,000 to 50,000. cubic feet per hour capacity, which size is larger than is required The ordinary rotary type will only be adopted in stress of circumstances, and with reluctance.

The best method of supplying power to drive exhausters is a matter which each engineer can best decide by taking into consideration his local conditions. If cheap fuel, such as breeze, is available and cannot be profitably disposed of, and further, if steam is required for such purpose as sulphate of ammonia manufacture, it will probably be the cheapest course to adopt steam power. No breeze has ever been made at Knowle. Consequently none has to be disposed of; and sulphate is at present not made. The only use for steam is that of occasionally heating holder tank water; and this is accomplished by a very diminutive boiler—a waistcoat pocket type. Gas-engines are employed, are very economical, and give little trouble. They require rather more intelligence in their manipulation than steam-engines; but this brings out the better qualities of the men who attend to them.

NAPHTHALENE.

The deposition of naphthalene is still a great nuisance in some works and distribution plants. Why some works should suffer from it and others have no trouble appears difficult to account for, though no doubt reasons exist. For my part I am pleased to know that I never suffer from it either on or off the works—a condition of things which I sincerely hope will continue.

AMMONIA EXTRACTION.

The problem of the extraction of ammonia is one in which divergent opinions exist. The Livesey washer is an excellent piece of apparatus, and performs the double duty of extracting tar and ammonia admirably. It is, however, subject to one defect—being difficult to clean; the whole of the tubes having to be dismantled, which operation takes much longer time to perform than can conveniently be spared. In consequence of this defect, I have designed and fixed a washer which embraces all the good points of the Livesey, but which also has the advantage that the foul tubes can be withdrawn and a clean set inserted in less than an hour. This washer is being used, and also a Livesey washer, and so satisfactory are the results that I am shortly putting down another washer, when the gas will have to pass through all three appliances.

To fix plant which causes back-pressure—each washer causes about 25-10ths—will no doubt be considered doubtful practice; but my observations lead me to a different conclusion. At present a tower scrubber is in use as the finishing apparatus. In the near future four washers will be used in sequence; the whole giving about 10 inches of back-pressure. These will be sufficient to remove the whole of the ammonia, except perhaps 2 grains per 100 cubic feet. From a purely financial point it does not pay to put down plant to remove the ammonia under 7 or 8 grains. The washers are not worked, as would be imagined, by passing clean water through the last and liquor through the other; but each is charged with clean water, which is brought up to the required strength. The first washer is worked up to 6° Twaddel, the second to 4½°, and the scrubber to 3½°. When the quartette is working the method will be: First washer worked up to 6°, the second to 5°, the third to 4°, and the fourth to 3°.

Experience shows that ammonia is absorbed rapidly until the liquor is 3°. Afterwards it becomes sluggish, until it reaches a point when it is not possible to increase its strength. The first washer takes up about two-thirds of the ammonia remaining in the gas when entering the washer. Accepting authorities, this is about 250 grains, varying with the kind of coal used; therefore the remainder is about 80 grains. Fully half of this is removed in the second washer; leaving about 40 grains to be removed in the scrubber. This task is too great for it; hence my decision to instal additional washers, which can be purchased and fixed at a very low cost. The total cost of providing and fixing four washers, equal to removing the ammonia down to 2 grains from 150,000 cubic feet of gas per diem, is not more than £200. It may be thought to be unwise to thus increase back-pressure, instead of using a washer-scrubber driven by a separate engine. The latter course is always expensive in first cost, in working, and in oversight; and the disadvantage of having to put the whole out of action when cleaning or repairs are required is very great. With separate washers either can be laid off at will; taking out only a percentage of the washing power.

Observation of the meter supplying the gas-engine which drives the exhauster furnishes some interesting facts. Each additional washer can be worked at an increased consumption of 2½ cubic feet per hour. Thus four washers would only require 10 cubic feet per hour or 240 feet per diem; and at a holder cost of 1s. per 1000 cubic feet, the additional cost is under 3d. per diem. To run a small gas-engine to work a washer-scrubber would require possibly 20 cubic feet per hour—being double the amount; and repairs, attendance, &c., would be additional cost.

Working washers in the way described removes a very large quantity of carbonic acid, sulphuretted hydrogen, and sulphur compounds. When either washer is off for cleaning, the effect is quickly seen in the purifiers. With four washers in action, possibly the life of the contents of the purifiers will be considerably prolonged; while the saving in labour will be an appreciable item. I should not mourn the loss of the sight and smell of newly-discharged purifying material. Only three purifiers are in use, each charged with artificial oxide of iron, and a small quantity of air, about 1½ per cent., is admitted for revivification *in situ* purposes. But it is fully six months since one was opened for cleaning.

With others, I find that the use of air has marked effects beyond the purifiers. It appears certain that the whole of the oxygen is not absorbed, rust in the water of the holder tanks being evident, showing inside oxidation; and increased stoppages of consumers iron pipes by rust, especially where wet meters are in use, is noticed. Dry meters, too, appear to be passing gas unregistered in small quantities more frequently. This may be due to rust particles on the valves, or to altered methods of production being responsible for drier gas being made, and consequent absorption of the oil on the diaphragms, thus causing porosity.

STEEL MAINS.

Distribution of gas by steel mains is increasing very rapidly, and rightly so. They possess almost every good point necessary, and only lapse of time can demonstrate whether they are sufficiently durable to warrant their even greater adoption. So far no evidence has been advanced that they are subject to undue decay when supplying gas, provided due precautions are taken. While I do not go so far as to say that I shall not lay any more cast mains, I shall certainly not do so except under footways and in positions where the usual lengths of steel mains would be difficult to lay. Various methods of attaching service-pipes to the mains have been tried; but the best is a clip, made locally, which is fixed on the main before drilling and drilled through into the main. The best socket joint is about half yarn, a quarter lead wool or wire, and the final quarter run lead.

EDUCATION OF GAS-FITTERS.

Technical education of gas-fitters is now a question very much to the front; and it has my warmest support. That men should be properly equipped is necessary and desirable, both for their own welfare and the prestige of the particular commodity the sale of which they are seeking to enlarge. Care, however, needs to be exercised even in such matters as training gas-fitters. Unless the instructors are expert, both theoretically and practically, the result of the teaching will be unsatisfactory. It is much to be hoped that the lack of certificates will not operate detrimentally to men who are excellent workmen, possessing large natural ability, but who could not pass the examinations owing to lack of early education. In addition to theoretical and practical knowledge of gas and its uses, what is required of men to-day are tact, courtesy, honesty, and, not least, willingness to work.

PREPAYMENT INSTALLATIONS.

Prepayment meters and fittings installations are now such a well-established rule with gas undertakings that little can be stated

about them that is fresh. If, however, they are fixed regardless of the results to be derived from them, they will not be of such financial benefit to the undertakings as they should be. I have for some time stimulated the use of gas by cottagers by fixing good inverted pendants and burners in prepayment installations, instead of the usual stiff kitchen pendants, and fixing additional pipes and fittings at low prices. Prospective consumers are informed that at least 5s. must be deposited in the meter each quarter, on pain of removal. Removal has had to be made in a few cases; but as this is somewhat of a stigma as well as a discomfort, the consumers now keep up their consumptions without any inducement. When the system was first adopted, the average sale per consumer per annum was 8000 cubic feet, which has grown to over 11,000 cubic feet; and this amount pays well.

DISPOSAL OF PROFITS.

One of the problems which confront gas engineers is the proper disposal of profits over and above the amount required to meet interest and sinking fund charges or dividends, as the case may be. Considerable conflict of opinion exists as to which is wisest —whether to write-off capital or reduce the price of gas. I hold a decided opinion that the price of gas should be as low as it is possible for it to be, and that present-day consumers should not be charged high prices so that consumers years hence should be charged low prices. Low prices bring immediate and certain business and the goodwill of the consumers, together with increased prestige for gas; high prices bring competition, and a name for hard dealing, both of which should react on the business. While it is true that in about ten years writing-off capital begins to operate favourably, it cannot be just and equitable for persons who may then have passed beyond the bourne to pay for privileges to be enjoyed by those following behind them.

THE ACCOUNTANT'S DEPARTMENT.

This address would be incomplete without reference to one class of persons connected with our industry. I refer to the book-keeping and accountancy side. I fear that we do not give due recognition to those who have to record faithfully and well the financial transactions, the records, and matters generally connected with the many ramifications of our business. The proper designing of new books of record or finance, which shall present in concise and illuminating form just what is necessary to be seen in the future as well as in the present, is one which requires as much care, imagination, and forethought as does the design of a large portion of our plant. The correct preparation of statements of accounts and balance-sheets needs considerable acumen and ability, which is only realized when actually engaged in such work; and persons who take up even secretarial work of a small nature often find that there is far more knowledge required than meets the eye. Without efficient work in this department our other labour would be incomplete and unsatisfactory.

WHAT OF THE FUTURE?

I have touched very briefly on some of the topics which interest us to-day. Now, what of the future? Are we going to do our part to make the world brighter, better, and more beautiful than we found it, or are we going to simply mark time—slide along the path of least resistance and go as quietly as the world will allow us? Rather let us gird up our loins, expand our chests, and run a straight race with victory in sight. Gas has still a great future before it. It is, and will be more so, indispensable for assisting in the advance of the world; and we must be up and doing, ready to place the commodity we have to supply for the benefit of mankind to the best advantage for use, and conscious satisfaction will not be the least of our rewards.

VOTE OF THANKS TO THE PRESIDENT.

Mr. PEARSON said they had listened to a very able and instructive address from their new President, who had had considerable practical experience in gas matters, so that his views put together in this way were very useful indeed. The address had consisted of a general survey of gas affairs, and would repay study when available in print. He could not say that he agreed with Mr. Ward in every instance, and especially was this the case with regard to vertical and horizontal retorts. He was pleased to hear the President was an advocate of larger dip-pipes and larger gas take-off pipes. The size of these pipes was a matter which called for attention; for the makers of retort-settings sometimes fell into an error which led to needless trouble and expense afterwards. Another thing which Mr. Ward had done well to bring forward was the advisability of keeping good accounts. There was no doubt that accounts properly kept, so that the engineer knew where he was spending his money, were most useful. They were, in fact, an education in themselves. Of course, in buying coal it was not wise to look at one fact only; there were many points to be considered. The products obtained and their realizable value should be set against the market value of the coal. In other words, a balance-sheet should be made. Only in this way could they arrive at what was best for them to use. He proposed a hearty vote of thanks to the President for his address.

Mr. R. J. ROGERS, in seconding, endorsed all that Mr. Pearson had said with reference to the practical character of the address. Though it was, of course, one of their rules that Presidential Addresses should not be discussed, he said he would like to add a few words on one point—that was, the education of gas-fitters. Mr. Ward mentioned that increased attention was rightly being given to this subject, and expressed the hope that older men who had not had the benefits of elementary education, but who were in every respect practical fitters, might not be placed at any disadvantage in the examinations. This point had, he (the speaker) believed, been very clearly kept in mind by the examiners appointed by the Institution of Gas Engineers and by the City and Guilds of London Institute; and he did not think the scheme would operate unfairly in the case of any man who presented himself for certification. A great deal of latitude would no doubt be allowed to such men as the President had in view.

Dr. W. B. DAVIDSON, who supported the vote, remarked that he had listened with great pleasure to the address. As usual, Mr. Ward had brought forward some important practical points; and he (the speaker) agreed with what had been said about makes of gas per ton of coal. A gas committeeman was apt to look at make per ton and wages, entirely regardless of other matters. If one did not get good coal, it was impossible to obtain good makes; and thus it was obviously unfair to compare one gas-works with another simply on the make per ton. Mr. Ward, however, was to be congratulated on the very high makes that he secured, while supplying a satisfactory quality of gas. There was no doubt that, by careful attention to horizontal-retorts, one could get very fine results, comparing with the best verticals.

The vote was then put to the meeting by Mr. Pearson, and cordially agreed to.

The PRESIDENT, in acknowledgment, said that at one time he thought it would be an impossibility to give an address at all, because things at his works were somewhat in a state of chaos. He had no office; and the contractors who were erecting for them a new building, which perhaps was unique so far as gas-works were concerned, were very much behind. Therefore he had been under great difficulties. The Council had placed on the programme for the present session a visit to Knowle and Solihull. This visit would take place in May, when he hoped that affairs at his works would be more settled, though he was sure they would not be entirely so. He would, however, make their visit as enjoyable as possible.

THE "INJECTOR-VENTILATING" GAS-FIRE.

The HON. SECRETARY, referring to the fact that one of the new patent "injector-ventilating" gas-fires of Messrs. John Wright and Co. had been fitted up in the room, and was in operation, explained that the makers had asked permission to give a demonstration of the fire at the meeting.

Mr. JOHNS said it was rather a good idea to have a fire there, as it gave the members a chance of examining one of the latest introductions in gas-fire construction.

Mr. ARTHUR FORSHAW (Messrs. John Wright and Co.) then briefly explained the principles on which the fire is constructed. He said he had no intention of delivering a lecture, but merely wished to show them that the "injector-ventilating" fire was an advance on anything they had done before. In fact, it really did seem that it had done what no other gas-fire up to now had been able to accomplish. Coal-fires afforded a considerable amount of ventilation. Many times the volume of the air in the room was removed in the course of an hour. A great deal, of course, depended on the chimney-draught, which was a variable quantity. Now, if there had been a disadvantage alleged against the modern gas-fire, it had been in connection with the air of the room—that one did not get enough ventilation. Therefore, Messrs. John Wright and Co. set out to increase the ventilation afforded by the gas-fire, taking the coal-fire as the model. A lot of careful tests had been carried out with it; and it was found that, compared with other gas-fires of the same size, it got rid of twice as much air in the course of an hour. For a 14-inch "injector-ventilating" fire, like the one shown, the figure was 11,800 feet. Some other fires (their own and other people's), without the ventilating flue, gave 7500, 4500, 4850, 5600, and 5000 feet. He then proceeded to point out the principal features of the fire, which was fully described and illustrated in the "JOURNAL" for Oct. 13 [p. 75]. It had, he remarked, taken the firm a long time to so design a fire that, while there was a big gap between the top of the radiants and the bottom of the hood, one got all the products taken away, with a sufficient quantity of air at the same time. He demonstrated, by a smoke test, that all the products were passing away through their flue, and said this was the case with all fires the firm were sending out.

On the proposition of the PRESIDENT, seconded by Mr. JOHNS, Mr. Forshaw was heartily thanked for the demonstration, and briefly acknowledged the compliment.

ELECTRICITY IN GAS MANUFACTURE AND DISTRIBUTION.

An animated discussion then took place on the "Advisability or Otherwise of the Use of Electricity in Gas Manufacture and Distribution." The debate was opened by Mr. Pearson and Mr. R. G. Marsh; and, in addition to Dr. Davidson and Mr. H. R. Lamb (the Birmingham Corporation Electrical Engineer), a number of members gave their views on a subject which, as the event proved, is peculiarly open to "differences of opinion."

The replies of Mr. Pearson and Mr. Marsh to points urged by the different speakers brought to a close a successful meeting.

Yorkshire Junior Gas Association.—The annual meeting of the Association will be held on the 28th inst., at the Leeds University, when the chair will be taken by Mr. C. T. B. Roper, the retiring President. The report and accounts will be presented, and officers elected. After this business, the opening address of the session will be given by Mr. Ralph Halkett, of Glasgow.

BIRKENHEAD GAS-WORKS EXTENSIONS.

Opening of the Laird Street Gasholder Station.

The members of the Gas Committee of the Birkenhead Corporation assembled at the gas-works in Thomas Street on the 6th inst., under the leadership of the Chairman (Alderman J. H. Gaul, J.P.), and, accompanied by a number of guests, they were conducted round the works by the Gas Engineer and Manager (Mr. T. O. Paterson, M.Inst.C.E.) and the Deputy Gas Engineer (Mr. R. H. Brown).

The party first inspected the works of reconstruction which were authorized by the Council in October, 1908, at an estimated cost of £120,000, including the carburetted water-gas plant, which has been removed and rebuilt on a vacant area, occupying about 1¼ acres. The whole of the buildings are new, and stand on a raft of concrete, reinforced with expanded metal; all the weights being distributed so that no portion exerts a greater pressure than one ton per square foot on the subsoil, as the site is practically the bed of an old river.

The Generator and Other Houses.

The large generator-house is a steel-framed building filled in with 4½-inch reinforced brickwork. Attached to the building are the machinery, meter, and boiler houses, with tall chimney. The plant consists of four sets, each capable of making 900,000 cubic feet of gas per day of 24 hours, or a total available capacity of 2,700,000 cubic feet per day, with one set always acting as a stand-by. Three of these sets were removed from the old site, and reconstructed, while one set is entirely new. This plant was rebuilt by the Economical Gas Apparatus Company, of Westminster, and, we understand, has given every satisfaction. Four water-tube boilers—two by Messrs. Edwin Danks and Co., of Oldbury, and two by Messrs. Babcock and Wilcox with superheaters—are installed in connection therewith.

The machinery-house contains two No. 9 Sturtevant turbine-driven fans, running at 2000 revolutions per minute, with space for a third; two gas-exhausters, by Messrs. George Waller and Son, each of 275,000 cubic feet capacity; and water, oil, tar, and feed pumps of the "Oddesse" duplex type, by Messrs. Lee, Howl, and Co., of Tipton. The house is provided with an overhead crane.

The meter-house contains two rotary meters, each of 50,000 cubic feet per hour capacity, and an 80,000 cubic feet per hour square-cased wet meter, which was removed and re-erected. These meters can be worked separately, in parallel or series, as may be desired.

Storage and Purifying Plant.

The gas is delivered through a Colman cyclone into a small spiral-guided relief gasholder in a steel tank, of 150,000 cubic feet capacity (erected by Messrs. Samuel Cutler and Son), and afterwards pumped through the purifiers into No. 2 gasholder.

The condensing and scrubbing vessels are installed outside the building, under an overhead tank of 80,000 gallons capacity; and tar-separators, together with tar and wash-water wells, are fixed in connection with the plant. As Birkenhead water contains more than 20° of hardness, a Paterson water softener and heater is installed with the boilers. Two oil-storage tanks for the use of the works, of a total capacity of 50,000 gallons, or about 200 tons, are part of this plant.

Woodall-Duckham Retort-House.

The new Woodall-Duckham vertical-retort house, of a capacity of 200 tons per day, which is in process of "tuning-up," was next viewed, together with the extensive scheme of telpherage now approaching completion, including the generating plant, consisting of two 80 H.P. gas-engines and 50 K.W. Siemens generators. The latter are installed in a new block of buildings, comprising power-house, pump-house, boiler-house, and exhauster-house, which are now nearly completed, together with new tar and liquor wells, equivalent to three months' storage. New sidings, condensing, washing, and scrubbing plant will be provided as soon as the state of the Money Market permits.

It is interesting to note, in connection with this scheme of extensions, that since they were authorized the production of gas has gone up more than 200 million cubic feet per annum, or equivalent to 25 per cent. increase on the production at that date.

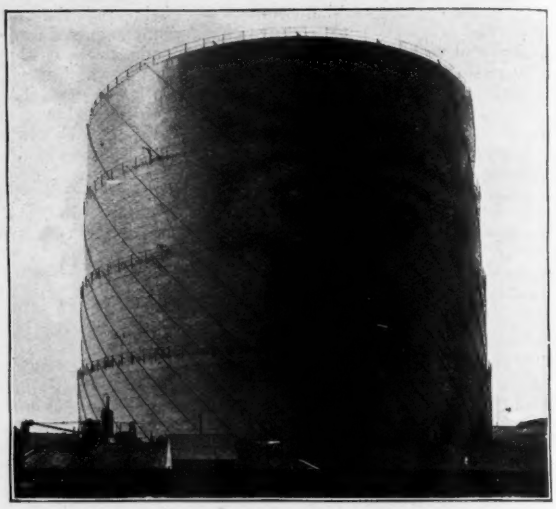
Compressor-House.

The Committee then proceeded to visit the compressor-house, for pumping gas from the works to the Laird Street gasholder station. This plant consists of two sets of compressors, supplied by Messrs. George Waller and Son, each of a capacity of 100,000 cubic feet per hour, comprising a cross-compound steam-engine of about 80 H.P., with a pump working upon each tail-rod—the gas-compressing cylinders being operated by a piston valve and a multiple back-pressure valve. These pumps are water-cooled for high pressure; and the engine cylinders and pumps are automatically lubricated. In conjunction with these pumps, a rotary meter of 125,000 cubic feet per hour capacity is fixed in each case and is worked in connection with one of Thorp and Marsh's anti-pulsators fixed in the basement.

New Gasholder Station.

The party next proceeded to the Laird Street gasholder station, which is situated two miles from the gas-works. It is connected to them by a 10-inch high-pressure steel main, composed of lap-welded steel tubes about 20 feet long, with rigid socket joints at the end; the ends of the socket being welded to the pipe by the oxy-acetylene process. These pipes were supplied and jointed by Messrs. Stewarts and Lloyds, Limited, of Birmingham.

The area of land purchased at Laird Street is 20,000 square yards, or 4·13 acres, of which 12,214 square yards is scheduled for the storage of gas, and on a portion of it the present works stand. The site is principally clay, but has through it certain sandy veins running, which carry water. On the whole, however, it can be considered as good.



The New Spiral-Guided Holder at Birkenhead.

[*Photo by R. W. Morris, Birkenhead.*]

The gasholder-tank is 165 feet internal diameter, and 35 ft. 6 in. deep. The top of the curb stands about 12 feet above the finished ground level; and the remaining 23 ft. 6 in. are below it. The execution of the works necessitated the excavation of about 16,000 cubic yards of earth; and 1000 yards of concrete have been filled in to form a foundation for the wall. The tank is built of local bricks and cement mortar, strengthened by the insertion of Brown's wire bond placed vertically in rings. About a million bricks were used in the construction of the tank. The inlet and outlet pipes are 30 inches diameter, of cast iron externally and steel internally, and are under the base of the wall. To support the holder when down, a steel framing is built inside the tank, composed of joist stanchions bolted to brick piers, the "umbrella" being composed of angles and tees in the usual way. The tank is rough-puddled outside, and entirely rendered throughout inside with ¾ inch rendering, in two coats, the finishing one being neat cement. After being filled with water for six months the tank is found to be bottle-tight. It contains about 4 million gallons of water.

The gasholder is on the spiral principle, with four lifts, each 35 feet deep; the inner lift being 153 feet, the second 156 feet, the third 159 feet, and the outer lift 162 feet in diameter, with cups 12 inches wide and 24 inches deep. The cups, together with the top curb, are of steel; the whole of the remainder of the sheeting being of wrought iron. There are 18 spiral rails on the inner lift and on the second lift; 36 on the third lift, and 48 on the outer lift. There are about 650 tons of metal in the holder, which throws some 12½ inches water pressure in working condition; and it has a capacity of a little more than 2½ million cubic feet.

As this holder is for use as a district holder, a governor-house for the accommodation of two district governors has been built, and one 24-inch Cowan governor is now installed. A small boiler-house, with Cochrane boiler, for steaming the cups, is also provided, together with two cottages for two men stationed there on day and night duty.

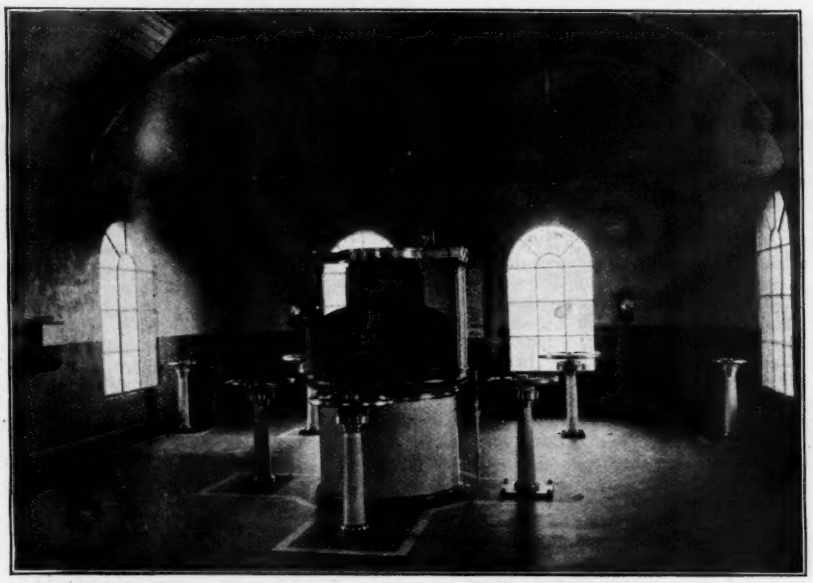
The site is surrounded by a brick boundary wall, and has suitable entrance gates, weighbridge, and weighhouse.

The total cost of the works on this station will be about £35,000; and now that it has been brought into use, it has greatly improved the pressure in this part of the district.

A Commemoration Tablet Unveiled.

After the Committee had inspected the works, they adjourned to the governor-house, and many expressions of appreciation were passed on the excellent manner in which the work had been carried out.

The Chairman, in unveiling the commemoration tablet, which was covered with the Red ensign, said that if the flag were lowered there or elsewhere he was quite sure it would again float proudly in the breeze. The tablet had been placed to commemorate the large extension scheme which had just been carried out. Of its necessity he need



INTERIOR OF THE NEW GOVERNOR ROOM AT THE BIRKENHEAD GAS-WORKS.

[*Photo by R. M. Morris, Birkenhead.*]

hardly mention anything. The old plant was entirely insufficient to keep up the proper pressure of gas in the town; and the Gas Committee, on the advice of their Engineer, had therefore erected the gas-holder. He was very pleased to welcome Mr. R. J. Milbourne, a representative of Messrs. C. & W. Walker, Limited, who had erected the holder, and said the foundations were beyond criticism; and he was sure the Corporation would always be in a position to give the makers a very good name. The capacity of the holder was 2½ million cubic feet, which would supply the town with gas for more than half a day at this period of the year. It would prove a valuable reserve stock. He hoped success would crown the efforts of the Committee. The Chairman then turned on the supply of gas from the new holder to the town.

Mr. R. J. Milbourne then presented the Chairman with a handsome rose-bowl. In the course of his remarks he said that what the visitors had seen was plain evidence of the very great strides the gas undertaking had made. He was justly proud to have the name of his firm on the tablet. He was sure the holder would meet expectations and render great service. With the engineering staff at the gas-works, it would be impossible for any contractor, even if he were so disposed, to put in any faulty work. The erection of the holder, from an engineering point of view, had been a great success, and would undoubtedly prove a profitable investment to the Corporation. The market was very low indeed when the contract was let, and there was very little work about at the time. In order to establish the auspicious occasion in the mind of the Chairman, he asked him, on behalf of the firm, to accept the gift.

The Chairman replied, sincerely thanking the firm for their kind action.

The party afterwards took tea together in the governor-house.

The tablet set forth that it was unveiled to commemorate the opening of the gasholder station by Alderman J. H. M'Gaul, J.P., on the 6th of November, 1914. Then followed the names of the Mayor (Mr. James Moon, J.P.), the members of the Gas Committee, the Town Clerk (Mr. James Fearnley), the Gas Engineer and Deputy Gas Engineer (Mr. T. O. Paterson and Mr. R. H. Brown), and the Contractors—for the tank, Messrs. Airds Limited; for the holder, Messrs. C. & W. Walker, Limited; and for the buildings, Mr. Richard Allen.

FIRE CLAY GOODS, AND THEIR USE IN GAS-WORKS.

By Thomas Holgate, F.C.S., M.Inst.C.E.

(*Continued from p.* 294.)

The foregoing comparison of the British results with the American is highly instructive, although we are without the information which would enable us to say that the tests were made on strictly similar lines. In the highest class of high temperature measurement there is now almost perfect concordance between British and American physicists; so that we may hope something akin thereto may be found in the work already discussed. Yet differences of treatment during the test may occur, such as the use in one case of an electric furnace and a gas-furnace in the other, with the concomitant difference in the composition of the atmosphere surrounding the specimen. Again, tests made upon clay, as against tests made upon bricks from the same clay, are not in all cases necessarily strictly comparable.

With these facts in mind, we may proceed to compare the British and American data already set forth with the melting points of fire-bricks ascertained by Mr. C. W. Kanolt, of Washington (U.S.A.). In these experiments the melting point was taken as the temperature at which a small piece of the brick could be distinctly seen to flow, subjected only to atmospheric pressure. What this means strictly may be understood from one item in Mr. Kanolt's list, where he gives the melting point of pure silica as 1750° C., and his caution that this is not the true melting point but is approximately the temperature at which silica flows distinctly. In this caution he is doubtless referring to the fact that silica begins to melt at about 1600° C. to an extremely viscous liquid; so that an exact melting point cannot be determined by the eye alone. Here we have a large difference—viz., 150° C.; and although the behaviour of silica in this matter of viscosity as affecting marked fusion is exceptionally high, the same property enters into play, though in varying degrees, with various fire-clays.

It is essential, then, to bear this in mind when interpreting the following figures from Mr. Kanolt's table of results, and also to take note of the mode of procedure in testing which will be given presently. Only those materials germane to our present inquiry are quoted from Mr. Kanolt's list; and we observe the lowest melting point to be 1555° C. for a fire-brick with a maximum of 1725° C. for a more refractory one of his 41 specimens. Here, then, we have figures which we may see are equalled by the British clays found by Dr. Mellor to range in his twelve specimens from 1580° to 1770° C. normal melting point.

Table III.—*Giving Melting Points, as Contrasted with Softening Points. By C. W. Kanolt.*

Material Tested.	No. of Samples.	Melting Point.
		C.
Pure silica	..	1750°
Pure alumina	..	2010°
Kaolin	3	1735° to 1740°
Silica brick	3	1700° to 1705°
Bauxite brick	8	1565° to 1785°
Fire-clay brick	41	1555° to 1725°

The figures of Mr. Kanolt appear also to be in reasonable agreement with the conclusions of Messrs. Bleininger and Brown, as already discussed, when we make the necessary allowance for depression of melting point due to applied pressure. If this be so, we may adopt the view that the clays in the second group of the 1914 report are not behind the American fire-clays in resistance to heat. Doubtless Dr. Mellor's, and probably Messrs. Bleininger and Brown's, tests were made with Seger cones; but those of Mr. Kanolt were carried out as follows: The tests were made in an Arsem graphite resistance vacuum furnace, and the temperatures were measured by an optical pyrometer of the Holborn-Kurlbaum type, calibrated by sighting the carbon filament of the pyrometer lamp into a platinum resistance furnace, and also checking by the freezing points of pure metals. Samples of the materials, about 1 to 2 cm. in diameter, were enclosed in a tube composed of a mixture of kaolin and alumina in the ratio required for the formation of sillimanite, to protect them from the small amount of reducing gas in the furnace, and were heated at a rate giving an increase of 10° C. per minute when near the melting point.

The various factors set forth in the foregoing sentence are all of importance in the making of tests; and they are here brought forward because of their further significance in practical work, as will appear in the later stages of this article. Their importance has been recognized by the staff of the National Physical Laboratory, who, in 1909, made several tests on fire-bricks to determine the

point at which they soften under small load. For this purpose, an electric arc furnace with vertical graphite lining tube was employed, in which a small disc-shaped sample was heated; its temperature being determined by an optical pyrometer. Considerable difficulty was experienced in cutting samples, both from the very hard and from the very friable types of brick. In 1910, arrangements were made for a large gas-furnace supplied with compressed air and capable of taking a whole brick, submitting it to definite loads, and heating it up to 1700° C.; the point of softening being under observation. Later, it was decided to observe also the effect of a reducing atmosphere upon the fusion of the bricks.

In order to further prepare for the consideration of fire-clays in practical work, we must now profit by the researches of the modern petrologists, and proceed to quote from the writings of one of the foremost—viz., Professor J. P. Iddings—who recently lectured at University College, London. Speaking of igneous rocks, he says: "The most obvious result was the demonstration of the adequacy of fusion and gradual cooling at ordinary atmospheric pressures to bring about the crystallization of many minerals found in igneous rocks, and the necessity of some catalytic agency to promote the crystallization of other minerals common to these rocks. Such actions were ascribed to "mineralizing agents" or "crystallizers"—assumed to be in most instances dissolved gases, chiefly water."

It is desirable to interrupt the quotation here, in order to point out that a recent investigation into the composition of Glenboig fire-clay turns in its interpretation upon the amount of combined water in its clay substance [*vide infra*], or aluminium silicate.

"One of the most significant facts brought to light by the researches of Day and his colleagues is the new conception of high viscosity found in alkali-feldspars and quartz." This part of the quotation, and that given in the following sentence, should be studied in relation to the melting point of silica or quartz (SiO_2) [*ante* Table III], and as related to the yielding of the fire-bricks under load already discussed. "Viscosities so great at temperatures near the transition point of liquid to crystal phase as to be indistinguishable within the two phases—that is, the viscosities of the amorphous glass, and of the crystallized mineral—are so nearly identical that the two phases of the substance react alike toward mechanical stress. Molecular mobility is so slight that readjustment from crystalline arrangement to the homogeneous chaos of liquid molecules is accomplished with such extreme slowness that the time of ordinary laboratory observation is not sufficient for its detection. However, the time available for ordinary 'geological' processes, so called, is sufficient, as shown by the devitrification of volcanic glasses composed of these constituents—ancient rhyolitic obsidians.

"The function of a catalytic agent as a gas dissolved in such a viscous liquid is obvious. The viscosity is reduced and molecular mobility increased. If the transition is towards the liquid phase, solubility of the crystal is increased; if it is towards the crystal phase, the rate at which crystallographic molecular arrangement is accomplished is increased. The dissolved gas becomes a 'crystallizer' or 'mineralizing agent.' Other substances—such as mineral compounds—yielding less viscous liquids than those of the alkali-felspars and quartz, when dissolved in the more viscous liquids, reduce their viscosity in the same manner, though not to the same extent, as dissolved gases. They must behave catalytically toward crystallization as gases do. Their behaviour in this respect has not been generally recognized, though the function of certain liquid compounds as fluxes or as 'mineralizing agents' is well known."

The substances referred to by Professor Iddings in the last three sentences as mineral compounds are doubtless similar to what we are accustomed to term the fluxes when speaking of the components of a fire-clay or brick. One of the original sources of clay is now recognized by authorities, including Professor H. Ries, as the mineral muscovite (K, H) Al (SiO_4)—a potassium hydrogen aluminium silicate; and upon this substance some of Professor Iddings' remarks have an important bearing, as well as upon the Glenboig fire-clay already mentioned. On this part of the subject he says: "One of the most important factors in the discussion of the chemistry of igneous rocks is the *rôle* of hydrogen, whether as an active base-forming element or as a catalytic agent alone, as hydrogen (H), or combined with oxygen, as hydroxyl (OH). An example of such a compound among pyrogenetic minerals is muscovite; and its formation involves the presence of hydrogen to play the *rôle* of metal. Muscovite is common in some igneous rocks rich in silicon with much uncombined silica, and also in others comparatively low in silica, accompanying orthosilicates and nephelite ($NaAlSiO_4$). It forms by the side of polysilicates—orthoclase and albite—and even with the disilicate, petalite [$LiAl(Si_2O_5)_2$]."

After discussing in detail the chemistry of the various changes, Professor Iddings says: "From these facts it must be concluded that the formation of the acid orthosilicate (muscovite) in the presence of polysilicates and free silica must be assigned to the chemical activity of hydrogen at high temperatures under sufficient pressure to hold it in the liquid magma solution." These valuable quotations have been condensed by the writer, and inserted here to bring home the importance of noting in all analyses of fire-clay the magnitude of the free and the combined water, and of remembering that at high temperatures in the process of firing the bricks, the hydrogen therein may have a large influence in determining the nature of the finished product.

(*To be continued.*)

LECTURE ON TOWN-GAS ENGINES.

Equally successful with the first was the second of the course of three lectures by Mr. W. A. Tookey on the operation, erection, and selection of "Town-Gas Engines," arranged by the London County Council in conjunction with the London and Southern District Junior Gas Association. This was delivered last Friday evening at the Westminster Technical Institute, Vincent Square, S.W., when a large and eminently practical audience followed with the closest attention the useful information which was given to them as the result of the lecturer's wide experience. Again the programme was a full one; for it had been announced that the subjects to be dealt with would include: Engine sites, alignment, direction of driving, size of bolts, &c., foundation-pipe connections, gas-bags and pressure-regulators, meters, tank and pump circulation of cooling water, utilization of waste heat, and indicating and indicator diagrams. Mr. Tookey, however, was equal to the occasion. He did not spare himself; and in a couple of hours (with the aid of many lantern-slides) he succeeded in imparting to his audience an astonishing number of "wrinkles."

Selection of a Site.

Some remarks of a practical character were first of all offered on the selection of a site—a matter which very often does not receive the consideration it deserves. In many cases it appears to be forgotten, the lecturer said, that the continued operation of the engine is so vital that it is after all the most important machine throughout the factory. The best position for an engine is one where there is plenty of ventilation, plenty of light, ample means of access, and continual supervision of a passive rather than of an active character. Wherever circumstances permit, it should be in the centre of the shop in which is placed the machinery it drives. If the heavier machines can be arranged nearest to the engine, the saving, not only in first cost for the shafting, but also in the frictional load involved in the running of it, is well worth consideration. Whenever possible, the engine should be erected on the ground floor, as being preferable to a basement; and, generally speaking, it is advisable to select a site where the main driving-belt will be taken from the left-hand side of the engine in a direction away from the flywheel when looking towards the latter from the gas-regulating cock. The main belt is best protected by being taken close against a side or main wall, when circumstances decide that a more central position cannot easily be secured.

A diagram was shown on the screen, which gave the recommendations of the makers with reference to the passage-ways that should be allowed round gas-engines of (say) 20 B.H.P. In round figures, an allowance of 2 feet of space was suggested for the sides and 3 feet at the back. With regard to the front, no figure was given. The belt should drive a main-shaft placed in front of the flywheel in its direction of rotation, and not, if it can possibly be avoided, where a backward drive would bring the belt towards the cylinder end of the engine. For any belt to run true, it is, of course, absolutely necessary for the engine to be in correct alignment with the main shafting. If the shafting is already in position when the engine is erected, it is not a difficult matter to obtain proper alignment, as long as the foundation bolts are not cemented solidly in the concrete bed, but are left free to move in holes until the engine-frame has been squared-up with the line shafting, and properly levelled. If, however, the engine has to be set up before the shafting has been erected, more care is necessary.

Foundations.

On the subject of foundations, Mr. Tookey pointed out that the length and width are usually settled with reference to the area over which the engine-frame will extend; the concrete bed being 10 or 12 inches longer and wider than the iron baseplate. The depth of the bed depends upon the nature of the soil; but it must be at least as deep as will provide about 6 cubic feet of solid concrete for every B.H.P. at which the engine is rated to deliver as working output. If during excavation it is found that a portion of the surface exposed is soft, this particular portion must be more deeply excavated, until solid ground is reached. When the ground is what is generally known as "made-up," and solid earth cannot be reached at a reasonable depth, it is advisable to excavate rather more deeply than would be done in good soil, and fill in at the bottom with about a foot depth of "hard core," well rammed down. Over this some coarse concrete should be roughly levelled, and when firmly set a layer of specially prepared felt or a mixture of coke and felt should be spread; the proper bed being afterwards built-up on this resilient foundation. In this way it is possible to avoid the communication of vibration to surrounding property. On marshy land it is sometimes necessary to drive a number of piles down into the ground, so as to enclose an area four to six times greater than the normal foundation. Between the piles a slab of concrete, from 9 to 12 inches thick, should be placed, so as to enclose the head of the piles and form one solid base upon which the ordinary foundation can be built-up.

Engines that must be placed upon the floors of upper storeys of a building may be bolted to timbers properly placed above and below the floor joists, in a manner which was indicated by diagrams. Layers of anti-vibration material above and below the floor joists may be adopted with satisfactory results. But in this case (if there is no oil-groove cast as a portion of the engine-

frame), it is advisable to provide a sheathing of sheet lead immediately below the engine-frame and extending on all sides with the edges rolled over a fillet, so as to prevent any deleterious effect that might arise from the splashing or spilling of lubricating oil.

After giving further useful information with regard to the making of concrete foundations, the lecturer said the formation of trenches for the reception of the various connecting-pipes is a matter that should never be omitted. On no account should either the gas or the air supply pipe be carried in the same trench as that containing the exhaust-pipe, nor should the separate trenches be in communication, except at the large pit to be formed under the engine-cylinder. All trenches should be covered over with chequered plates; and a narrow strip of matting should be provided where the trenches are laid along or across the passage-ways.

The Exhaust-Box.

Turning to another point, and fully explaining the reasons for his views, Mr. Tookey said the exhaust-box should not be placed close to the engine-cylinder. The best arrangement is one in which the box is placed at, or near to, the termination of the run of the exhaust-piping. By placing the exhaust-box at some considerable distance from the engine-cylinder, the pressure of release is not suddenly reduced, but much more gradually; and the energy due to its pressure is altogether absorbed by the putting in motion of the column of gas between it and the atmosphere throughout the entire length of the connections. It will be apparent that one effect of putting in rapid motion the column of gases previously expelled and remaining in the pipe, is to induce the outward flow to be continued after the exhaust-valve has been closed; and, in fact, by such means the gases may be in motion continually, merely being impelled more rapidly by the intermittent propulsive effort of the higher pressure gases escaping from the cylinder in succeeding cycles. When the exhaust-box is placed at the termination of the connections, the initial energy of the gases at the release pressure is utilized to the full extent. Occasionally one box is insufficient to secure the desired quietening of the noise of emission to the atmosphere, and further treatment is called for. Two or more similar boxes may be placed in series, or there may be used one box of greater capacity partially filled with large stones, through which the gases escape with reduced velocity and diminished noise. Such filled silencers, however, have the disadvantage of becoming choked in time, and should be periodically examined. But it is not only in stone-filled silencers that excessive accumulation of deposit can occur. It may be found within the pipes themselves, and particularly in certain portions. It is advisable, therefore, to provide such facilities when erecting gas-engines that, when necessity arises, the proper and efficient cleaning of exhaust connections can be carried out with readiness. Care must be taken, too, to arrange the exhaust-pipes with a slight inclination, so as to drain naturally into the exhaust-box. When this inclination cannot be provided, it is advisable to arrange for what are known as "drop bends" to collect condensate. Again, proper provision should be made for the expansion of the pipes due to working temperatures. Reference was then made to the pits that are sometimes provided for the more effectual silencing of the escaping gases; and some remarks on the air-connections followed.

The Gas-Supply Arrangements.

The relative positions of the various gas-fittings and their interconnection for an engine supplied with gas taken from the town mains formed the subject of a picture on the screen, and afforded Mr. Tookey an opportunity for pointing out a number of important facts. As to the meter, the proper size for an engine of a certain brake horse power as working load may, he said, be computed on the basis of 10,000 B.Th.U. per brake-horse-power-hour; and as the usual standard of town gas is about 500 B.Th.U. per cubic foot, it can be accepted that, when working at its full output, an engine requires 20 cubic feet of gas per brake-horse-power-hour, or, in terms of meter reading, 3·3 lights. It is always advisable to instal a gas-meter of ample size; but as in the majority of cases an engine is rarely, if ever, required to work to its full output, some little latitude may be allowed. An engine rated at 32 B.H.P. would consume at full load (say) 640 cubic feet per hour; and in such a case it would be permissible to instal a 100-light meter rather than the next size larger, which might perhaps be rated at 150 lights. The size of the pipe between the meter and the gas-bag should be that for which the outlet of the meter is fitted; any reduction to suit the inlet of the bag being made at the latter point. The bag should be at no great distance from the gas-inlet valve on the engine, and be bolted against timbers secured to an adjoining wall or partition in such a manner that the movement of the diaphragm is not impeded. There should really be sufficient space behind the bag for the movement of the diaphragm to be felt by hand, and the proper fulfilment of its functions noted.

Cooling-Water Connections.

To gain a proper insight into the problems that have to be considered in relation to the water-cooling connections, said the lecturer, it is best to think of the matter in much the same way as a hot-water engineer would do if he wished to ensure the proper circulation of hot water through a factory or other premises for which he had undertaken the responsibility of efficient working. Care should be taken that under no circumstances will the jacket rise to such a temperature as would enable scale to form. The outlet water connections should be of ample section, so as to reduce the resistance to flow to a minimum. Further, the flow-pipe should be at a continual inclination throughout its length, with the least possible number of changes of direction; and where bends are unavoidable, these should be of as large a radius as circumstances permit. So long as the water leaving the jacket is below 140° Fahr., the less the difference of temperature at the inlet the better; and to secure this, every possible means should be taken of ensuring adequately brisk circulation of a sufficient quantity of water. The storage capacity of the tanks naturally depends upon the size of the engine, and upon the mean climatic temperature. In the United Kingdom, the usual allowance is on the basis of about 30 gallons per rated brake horse power.

Transmitting the Power.

Various matters with respect to belt-driving were dealt with. There are, Mr. Tookey remarked, many practical considerations peculiar to each factory which must be taken into account in relation to belt-driving problems; and of these the most important are the speed at which the main shafting is to be revolved and the maximum amount of head-room at disposal. When a belt is properly chosen in relation to the power to be transmitted at a certain speed, and the tight side is on the bottom, stretching of the belt as a consequence of its working tension is practically negligible; and, in fact, the belt may still be kept in useful service if the upper or sagging side nearly touches the tight side during work. When, however, a belt is improperly chosen because of its insufficient width and speed, its working tension per inch of width is greater, and therefore its liability to stretch is increased, and in time slipping results. Trouble can be avoided if, when the engine is being erected, questions connected with the power transmission to the line-shafting are thoroughly considered. For this reason, if for no other, the work of the engine-erector should not be regarded as completed until he has seen that a proper drive has been arranged for.

Mr. Tookey concluded his lecture by explaining the methods of indicating, and the inferences to be drawn from a large number of indicator diagrams which were thrown upon the screen.

EXPLOSIBILITY OF MIXTURES OF AIR AND AMMONIA.

An instance of an explosion in an ice-making factory, which injured the stoker and damaged the building, having been brought to the notice of Professor H. Bunte, he found on investigation that the explosion must have been that of a mixture of air with ammonia which had escaped from the refrigerating plant. Since ammonia has been believed to be inflammable in air only with difficulty and on continuous heating, the conditions of explosibility of mixtures of air and ammonia seemed to call for investigation. They have now been studied at the instance of Professor Bredig by Herren E. Schlumberger and W. Piotrowski, at the Institute of Physical Chemistry of the Technical College at Carlsruhe. Their investigations are reported in a paper appearing in the "Journal für Gasbeleuchtung" for the 24th ult. (pp. 941-43).

Previous investigations by Henry in 1810, Hofmann in 1860, and A. Reis and F. C. G. Müller in 1911, on the explosiveness or combustibility of mixtures of ammonia with neat oxygen or with atmospheric air, are recounted. The chief reason why it had not hitherto been observed that mixtures of air and ammonia were explosive was that tubes or narrow burettes had been used for the investigations, and the cooling effect of the walls of such tubes is now known to be very great in the case of all explosive mixtures. The mode of ignition is also known to affect the occurrence of explosion in a mixture. A spherical vessel is most favourable to complete combustion or explosion, and ignition should take place just at the centre of the vessel. In these investigations Herren Schlumberger and Piotrowski secured a spark of the same strength for all the ignitions by the use of a ten-volt accumulator with an induction coil of specified construction and a long pendulum contact breaker. The pendulum, liberated each time from the same position, made contact for exactly the same period through a platinum point attached to its bob passing over the domed surface of mercury which was forced from a levelling vessel to the top of a tube rather over an inch in diameter. The pendulum was connected with one pole and the mercury with the other pole of the coil. The electrodes in the explosion vessel were of 0·3 mm. platinum wire; the ends being 6 mm. apart.

The effect of moisture on the explosibility of the mixture was studied. It was found that explosion occurred with perfectly dry ammonia and air dried only by passing it over concentrated sulphuric acid, whereas if the air were further dried by passing it over phosphorus pentoxide, no explosion ensued. Constant humidity was then secured for the remaining experiments by passing the air through dilute sulphuric acid (specific gravity 1·340) having an aqueous vapour tension at 20° C. of 8·494 millimeters.

Using as the explosion vessel a spherical bulb, 110 millimetres in diameter and having a capacity of about half-a-litre, it was found that in these conditions the explosive mixtures of air and ammonia ranged from 16·5 to 26·8 per cent. by volume of ammonia in the mixture. In a Bunte burette, 19 mm. in diameter, and with a spark-gap of 2 mm., no explosion could be produced, but continuous combustion was observed between the limits of about 19 and 25 per cent. of ammonia. The mixture corresponding with the combining proportions of ammonia and oxygen is 21·9 per cent. by volume of ammonia with air.

PROGRESS IN CARBONIZATION METHODS IN THE UNITED STATES.

Report to the American Gas Institute.

THE Committee of the American Gas Institute on Progress in Carbonization Methods, of which Mr. E. L. Spencer is Chairman, presented their report at the recent annual meeting of the Institute. It was accompanied by reports by various members of the Committee indicating the nature of the changes which had come under their notice; and the following extracts from them may be useful to "JOURNAL" readers.

THE COMMITTEE'S REPORT.

In opening their report, the Committee state that the general business depression which prevailed throughout the country during the past year has been felt to a considerable extent by those interested in the design and construction of carbonizing apparatus, and the number of plants contracted for was much below the normal. However, numerous installations which were under construction at the time of the Institute meeting in 1913 have been put into operation, and several very interesting designs of bench details have been worked out.

The Committee think there is no doubt that silica material for bench construction is finding many converts among gas engineers. This material has been used successfully in numerous horizontal retort-houses. A successful application of it to inclined benches has recently been made at Lynn (Mass.), where six benches of nines have been rebuilt with silica setting blocks and sectional silica retorts. These retorts have parallel sides, instead of being tapered as is usual with inclines.

The builders of the well-known plant at Worcester (Mass.) report that they are engaged in the erection of several installations of horizontals which contain novel features. These plants consist of silica benches of 16 retorts each. They are equipped with stand-pipes of rectangular section, which are located at the partition walls of the benches and act as front buckstays. To each stand-pipe, 16 retorts are connected. The hydraulic main is in the cellar. The stoking-machines are equipped with automatic devices for weighing the retort charges and also the fuel fed to the generators.

The installations of horizontals at Madison, Salem, and Philadelphia, mentioned in last year's report, have since been put into successful operation; and a similar plant is being erected at Toledo by the same contractors. All these plants are constructed of silica material, are machine stoked, and are equipped with a carbon dioxide return system.

During the past year, improved charging and discharging machines of the De Brouwer type were installed at Salem and St. Louis. These machines are of the projector type, and are equipped with weighing hoppers and automatic feeding rolls. The speed of the belt is automatically slowed-down as the retort is filled. At the Salem plant both the charger and discharger are mounted on the same carriage; and this type of apparatus is economically used in a retort-house of 600,000 cubic feet daily capacity.

One of the reports contains a description of the Congdon scrubber stand-pipe as used at Atlanta, together with an account of various attempts which have been made in past years to eliminate stand-pipe trouble. There has recently been placed on the market a producer which is stated to be capable of operating on bituminous coal or lignite, and which was designed to supply producer gas for heating carbonizing apparatus.

Vertical benches of the Woodall-Duckham type, which were under construction at the time of the Institute meeting in 1913, have been put into operation in the following cities: Holyoke and Brockton (Mass.), Derby (Conn.), and Schenectady (N.Y.). The largest of these is the Schenectady plant, with a capacity of 1,250,000 cubic feet per day. The retorts of the Derby plant are made of silica. Vertical benches of the Glover-West type have been brought into use at Fitchburg (Mass.) and Pawtucket (R.I.). Installations of this type of retort-bench are under construction at Portland (Me.) and Springfield (Mass.). The Springfield plant will have an ultimate capacity of 1,500,000 cubic feet daily, the others being smaller, Vertical benches of the intermittent type have been erected at Fall River (Mass.) and Hartford (Conn.), each installation having a capacity of 1,050,000 cubic feet per day.

A large coke-oven plant is being erected at St. Louis (Mo.) which is so designed that the ovens can be converted to gas-ovens if desired. It is expected that this plant will be in operation during the spring of 1915.

It has been suggested to the Committee that a study of the proper preparation of bituminous coal for gas making is a subject which would be of interest to those operating carbonizing plants; and they give the following extract from a letter from a well-known engineer who is engaged with a large coke-oven company:

> This subject of the elimination of impurities from coal before carbonization is one of very considerable importance in the coke-oven industry, where a high grade of metallurgical coke is of prime importance. Unquestionably it is of some importance also to coal-gas plants, and will be of increasing importance as the cost of the purest and best gas coals increases relatively to the cost of coals running somewhat higher in sulphur and ash. At most of our larger plants, we have operated Bradford breakers for several years This provides a cheap method of breaking the coal, and eliminates the large masses of pyrites and other material which are broken with greater difficulty than the pure coal The reduction in sulphur and ash by the use of this apparatus is comparatively slight. As the sulphur eliminated, however, is principally in large masses, we secure a coke in which the sulphur content is very much more uniform. If these large masses of pyrites go through the entire operation, samples of coke taken from different parts of the same oven may vary noticeably in the percentage of sulphur, which may give rise to controversies between producers and consumers. One of the great advantages of the Bradford breaker in practice is that it throws out pieces of iron and steel, which, if allowed to get into the pulverizers, may cause serious damage. We have used washed coal at two of our plants; but this process does not entirely reduce both sulphur and ash. It results in making possible the use of coals which without this preliminary treatment would be ruled out. As the percentage of ash in domestic fuel greatly affects the market value, I believe that in some cases washed coal might be of advantage in gas-works, especially where vertical retorts are used.

The Committee conclude by expressing the opinion that much good may be derived from formulating in detail a standard method of testing gas-works, and they suggest that the Institute should take steps to supplement the work which for several years was done in this direction.

The following are extracts from reports submitted by members of the Committee (whose names are given in parentheses) to which reference has already been made.

GAS MACHINERY COMPANY (MR. W. E. SIEINWEDELL).

The superiority of benches with silica retorts and settings has been so conclusively demonstrated that the advisability of using them is now conceded by all. Silica retorts must not, however, be confused with those made of silicious materials, containing only about 85 per cent. of silica, and which are frequently inferior to clay retorts. Silica material should be homogeneous.

Silica retorts, with silica setting blocks to support them, are essential for modern and economical operating conditions, as they can withstand high temperatures for several years, do not shrink nor change shape, and produce coal gas at less cost than clay retorts. They have the following advantages over clay retorts and settings:

(1) *Greater Durability.*—Silica materials are not affected by high heats; consequently refilling of arches is less frequent, and fewer benches are required for reserve.

(2) *Less Bench Fuel.*—Silica has 25 per cent. greater heat conductivity; higher heats can be used, and less carbon adheres to the retorts.

(3) *Greater Capacity per Retort per Day.*—The higher heats permit heavier charges and shorter time of carbonization; therefore fewer benches are required to produce a given quantity of gas.

(4) *Increased Strength.*—Silica maintains uniform strength at working temperatures; consequently fewer repairs are required.

(5) *Retort Alignment.*—Retorts neither sag nor bulge, as silica materials do not shrink nor soften under high temperatures. This is especially important where charging or drawing machines are used.

(6) *Less Scurfing to Remove Carbon from the Retorts.*—Carbon does not readily adhere to silica; therefore retorts are less frequently out of commission.

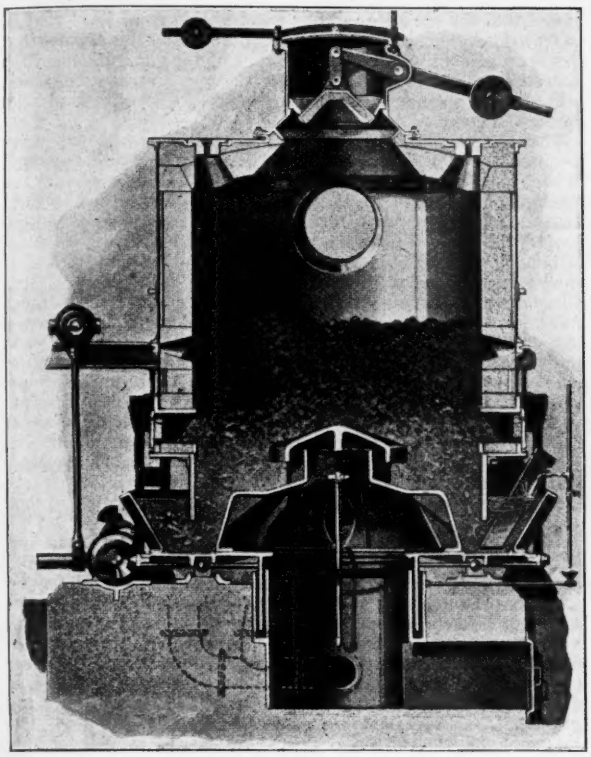
A number of additional installations of benches with horizontal through retorts, about 11 ft. 6 in. long, have been made during the past year, and the coke discharged by a hand-operated coke-pusher suspended from an overhead track. A manual coke-pusher can also run on a track level with the operating floor.

In addition to firing benches with gas made in producers provided with horizontal step and shaking grates, a gas-producer has been introduced with rotary grate suitable for burning bituminous coal, lignite, coke, and other fuels. The efficiency of this producer is high, as no heat is carried away by cooling water, and the fuel is completely gasified with the backward and forward motion of the rotating grate, and the ashes are automatically discharged. As the air and steam enter the fuel bed in a horizontal plane, this producer can operate with a minimum depth of fuel.

IMPROVED EQUIPMENT COMPANY (MR. E. Y. SAYER).

The large number of installations of the Doherty bench fuel economizer, known as the "carbon dioxide return system," made in the last few years has probably been due more to the fact that it has entirely eliminated localized heating than to any other advantage—giving an even temperature throughout the settings, and thereby prolonging the life of the retorts. The saving in the bench fuel and the elimination of clinkers in the producer has been appreciated for some years.

The results derived from the use of silica material in sectional retorts and settings since the report of last year have thoroughly demonstrated all the merits claimed for this material over the use of fire-clay and the so-called one-piece silica retorts. In 1913 the Improved Equipment Company were awarded a contract for the installation of five arches and fillings of 21-feet through nines for the

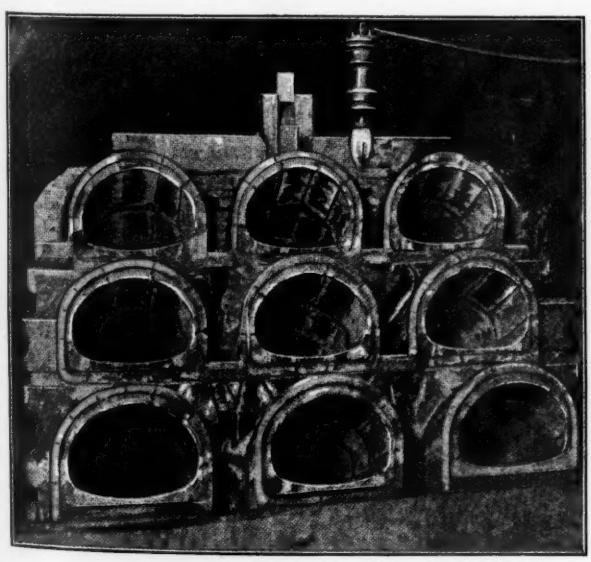


Gas Producer with Rotary Grate.

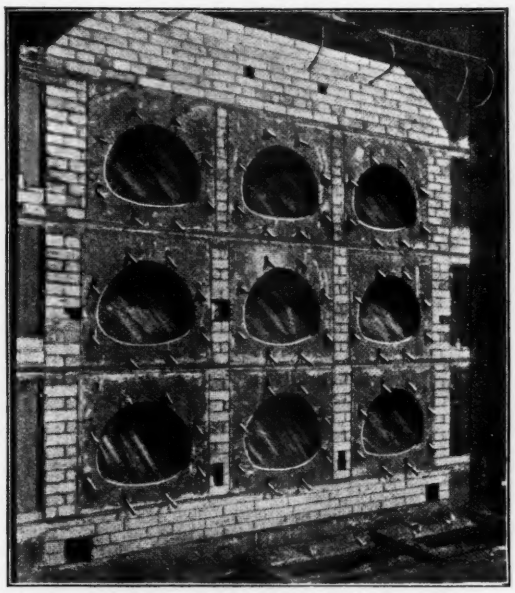
United Gas Improvement Company at their Point Breeze works; and in May, 1914, they placed with the Company another contract calling for the installation of seven arches and fillings of the same design. These benches are all equipped with sectional silica retorts and settings, and the special point of interest is the manner of applying the economizer to these fillings; the carbon dioxide being returned by means of fans from the outlet side of the waste-heat boilers through Venturi meters and under the producers. The secondary air for these benches is also introduced by means of forced draught through Venturi meters.

The first installation of large benches of inclines with sectional silica retorts and settings was at the plant of the Lynn Gas and Electric Company, the design of which was developed by the Improved Equipment Company, in co-operation with the Lynn Company, to meet the main objection to the inclined type of filling—that is, the settling of the retorts soon after the bench had been put into operation. The first installation consisted of two fillings of nine 18-feet retorts; and the Company have since placed with the Improved Equipment Company the contract for a duplicate installation.

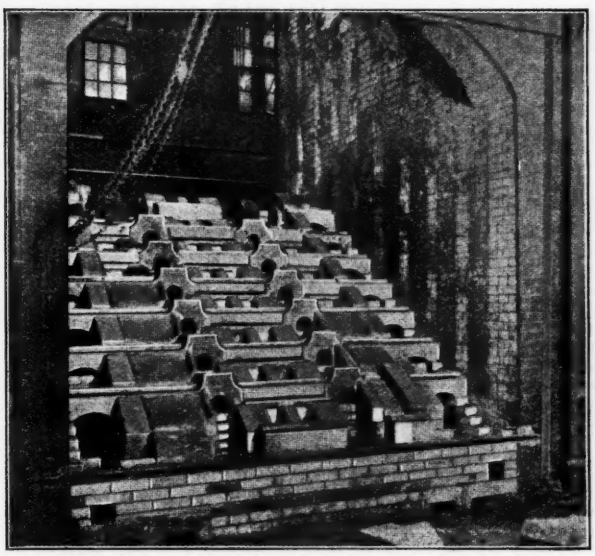
One of the radical departures from past and present practice in the building of these inclines—and it has thoroughly proved the merits claimed for it—was the adoption of a special design of sectional silica retorts, for which applications for patents have been made. The accompanying illustrations show the design and the manner of supporting the sectional silica retorts on the horizontal rests, instead of placing them, as customary, on an angle of 32° to 33°. This entirely eliminates the end-thrust which has been a bad feature of incline installations. No dampers have been used for the regulation of the amount of producer gas entering the combustion chamber, as this has been found unnecessary with the use of the "return" system. To meet the condition obtaining in a small plant, the Company build small inclined benches of sizes having a capacity of approximately 100,000 cubic feet of gas per bench per day; and they claim that they will produce gas at a labour cost very little, if any, in excess of the machine-operated house.



Upper End of Special Design Sectional Silica Inclined Retorts.



Mouthpiece (Lower End) of Special Design Sectional Silica Inclined Retorts.



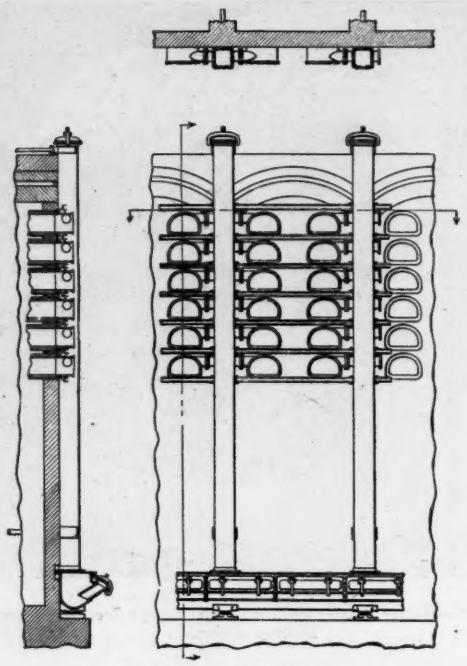
Commencing the Work of Installing Sectional Silica Inclined Retorts—Showing the Horizontal Supports.

PARKER-RUSSELL MANUFACTURING COMPANY (MR. D. R. RUSSELL).

It is difficult to secure data as to the operation of plants, as it is the policy of many companies not to give figures. I am indebted to Mr. R. C. Congdon, of Atlanta (Ga.), for certain information, as set forth in the following letter:

This plant is equipped with the Congdon patent scrubber stand-pipe system, and retorts 16 inch by 26½ inch by 21 ft. 7 in. long. When operating ten benches of nines, the labour required is as follows:

	Men per Shift.	Cost per 1,000 Cub. Ft.
Bench fires	1·53	$0·0032
Fiddes-Aldridge charging and drawing machine	1	0·0043
Mouthpiece lids	3	0·0097
No labour on top		
Total retort-house labour		$0·0172



Vertical Take-Off Pipe

When operating six benches of nines, the labour required is as follows:

	Men per Shift.	Cost per 1000 Cub. Ft.
Bench fires	1	$0·0047
Fiddes-Aldridge charging and drawing machine	1	0·0062
Mouthpiece lids	3·38	0·0107
Total retort-house labour		$0·0216

We work 12-hour shifts and 7½-hour charges. The yield per pound of coal for the first seven months of 1914 is 4·85 cubic feet. The average weight of charge is 1364 lbs. We use Black Diamond R/M coal and Westbourne washed nut and pea coal; the latter amounting to about three-fourths of the coal used. The coal is brought into our retort-house by a scraper-conveyor. The coke is also handled with a scraper-conveyor, which is arranged so that it can be operated in either direction. The coke going one way drops into the coke bin, and in the other direction into the water-jacketed coke-buggies, which are mounted on rails leading to the various water-gas generators. A small part of one man's time is required to look after the coke and coal handling. The coals we are using are of a cheap grade, and probably would not compare favourably with Eastern gas coals.

The average candle power of the gas for the first seven months of 1914 was 16·07. The candle-feet are, therefore, high. The gas was tested every hour throughout the period, using a flat-flame burner and the standard pentane lamp.

During the past year we have developed a special method of introducing steam under the grates of bench furnaces. This has been installed at a number of different points, and has proved to the satisfaction of the different companies that clinker can be totally avoided. The apparatus is very simple and inexpensive, both as to initial cost, repairs, and the amount of steam used, and can be attached by any company.

Riter-Conley Company (Mr. H. A. Carpenter).

All the retort-houses in course of construction at the present time by this Company are provided with benches of sixteen retorts each—that is, two rows eight high. During the past year, a number of additions and improvements were developed in connection with this system of horizontal retorts. They are charged and discharged by means of two machines working in conjunction—one machine conveying the coal to the retorts, the other, on the opposite side, acting as a producer charger, as well as a transporting means to enable the operator to open and close the lids on the producer side conveniently for the discharge. The charging and discharging operation requires but two men—viz., an operator for each of the machines.

Heretofore, in the operation of charging and discharging machinery for gas-retorts, considerable time has been lost, and inconvenience experienced, in passing signals backwards and forwards between opposite ends of the retorts, necessary on account of opening and closing lids and filling producers during the charging operation. A system has been developed whereby the lid of each retort on the producer side is locked and cannot be released until the lid on the charging side has been opened; and the operator on the machine conveying the coal to the retort cannot perform the charging operation until the lid on the opposite side has been opened. The result of this arrangement is that the operator of each of the two machines proceeds with his work without regard to the opposite end of the retort. He opens his lid, places his machine in the required position, and throws over his operating switch; but the charging operation does not take place unless the operator at the opposite end has reached this point first—that is, has previously thrown his operating switch over. It is claimed that this arrangement reduces the total time of the charging operation as well as the time that each retort is open to the atmosphere, prevents the opening of more than one retort at a time, and decreases labour.

The charging-machine is provided with automatic weighing mechanism, whereby a predetermined weight of coal is delivered to each retort. This mechanism is not under the control of the machine operator. The amount of coal delivered to the charging-machine from the storage bins is automatically weighed and recorded. To receive coal, the operator of the charging-machine, without leaving his platform and without other manual assistance, runs the charging machine underneath the coal-bin, placing it in a central position with the scales. He then moves forward an electric controller on the charging-machine, which causes the hopper of the machine to be filled with coal, the amount weighed and printed on a recording chart, together with the date and exact time of the operation. After this work has been performed, the electric controller returns automatically to its initial position, and the machine operator can then proceed with his work of charging the retorts with no greater lapse of time in taking coal than is consumed in charging an individual retort. The producer charger is provided with automatic recording weighing mechanism, which records on a 24-hour chart the exact weight and time the material is placed in the producers.

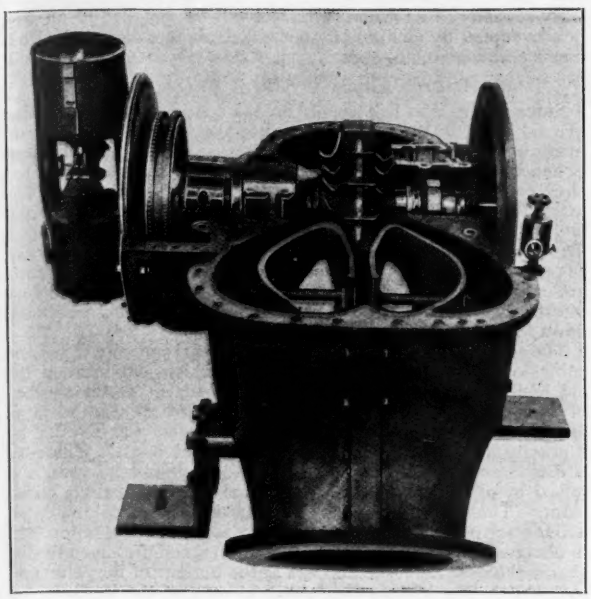
All these automatic weighing devices are under lock and key, with no part of them visible; and their nature is not necessarily known to the operators of the charging-machines—the intention being that the manager of the plant will, once in 24 hours, remove the record sheets, and place sheets for the succeeding 24 hours. Great accuracy is claimed for these weight records, and much advantage from the manager of each plant having before him every day a printed record of the weight and time of each operation of all coal carbonized and fuel used in the producers, as well as the total weight of these items for the 24 hours.

A new type of centrifugal gas-exhauster was provided by the Company during the year. [It is shown in the accompanying illustrations.] It is either turbine or motor driven, and in each case the entire exterior is covered by a gas-tight casing. All stuffing-boxes, water-sealed bearings, &c., heretofore used have been eliminated. It is the intention of the Company to provide these exhausters with extremely sensitive regulating mechanism of a considerable range of sizes and pressures. At the present time a 20-inch diameter inlet pipe steam-driven machine of 12-inch differential pressure is ready for delivery.

The system of patented vertical take-off pipes has been in use for two years, and during this time has thoroughly proved the elimination of the greater part of the arduous labour common in connection with the operation of take-off pipes for gas-retorts. In the first plant constructed, a circulating system was maintained, and the gas was cooled in the vertical pipes by the introduction of water at the top. It appears desirable, however, to maintain as high a temperature as practicable in these vertical pipes, in order to secure a fixing action for the large volume of low-temperature gas emerging from the freshly-charged retort; and in all new plants under construction water will not be introduced into the pipes.

During the past few years we have considered carefully the insulation of the exterior of the retort-benches, in order to reduce losses of heat through radiation. After building a number of different forms of structures for this purpose, it has been con-

Turbine Driven Exhauster—Exterior View.



Turbine Driven Exhauster—Interior View.

cluded that the most satisfactory way to insulate a stack of retort-benches is to surround it completely with a metal casing, with a highly efficient insulating material interposed between all parts of the metal casing and the refractory structure of benches within.

CONGDON SCRUBBER STAND-PIPE SYSTEM (MR. R. C. CONGDON).

During the year 1912, the Atlanta Company remodelled their coal-gas plant. Briefly, it consists of eleven through horizontal benches of nines, having retorts 16 in. by 24 in. by 21 ft. 7 in. long. The gas from each retort was conveyed to the hydraulic main by a steel stand-pipe 8 inches in diameter; and four of the twelve men employed on the works were required to keep clean this pipe, the bridge-pipes, and hydraulic mains. The stand-pipe problem was thus brought forcibly to my attention. My many experiments and study have resulted in a plant which has been operated for a year, during which time the stand-pipes, bridge-pipes, and seal-boxes have remained perfectly clean.

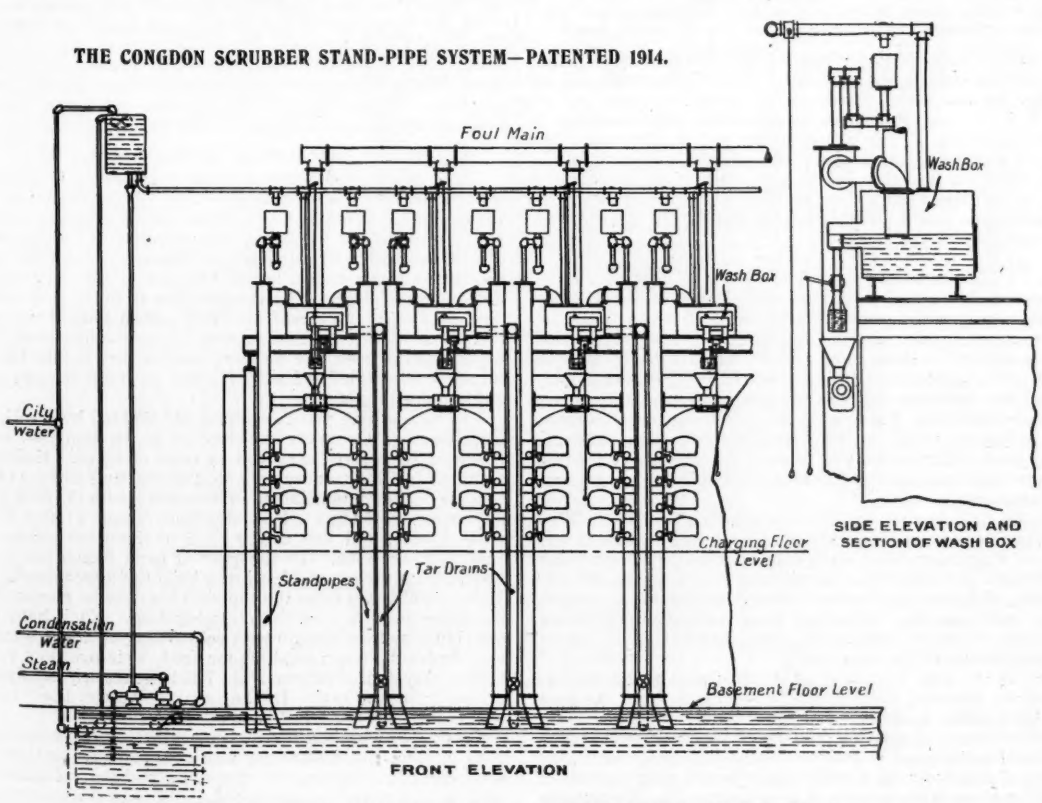
I conceived the idea of causing a moving film of liquid—a moving platform as it were—to pass continually over the inside surface of the stand-pipe. I reasoned that no stoppage could occur so long as the platform kept moving. Instead of attempting to condense the tar in the stand-pipe to cause a moving film, I intended to send a stream of tar over a dam at the upper end of the pipe. Evidently, the tar thus supplied to the ordinary stand-pipe would flood the retort. This difficulty suggested bye-passing the retort and sealing the lower end of the pipe in an open trough—open in the sense that it is not required to be gas-tight. The trough would contain only the circulating fluid.

In the first experimental apparatus, the stand-pipe shown was first connected to one retort, a separate tank or hydraulic main above was provided, and the pipe was carried through the operating floor to a seal in the basement. A Y connection was used to prevent disturbing the mouthpiece. A stream of water, instead of tar as first contemplated, was sprayed at the top of the pipe, and a T-piece and plug were conveniently located in the pipe for observation purposes. A thermometer was placed at the bridge-pipe, and temperatures were regularly taken. Later three retorts were connected, and it was found that the 8-inch pipe would successfully carry the gas, and that no stoppage would occur. After a month's test, the result of this experiment showed that if water was introduced in sufficient quantity, the stand-pipe, both above and below the floor, would remain perfectly clean, and that no pitch or heavy tar would accumulate in the bridge-pipe or the hydraulic main. Retorts from adjoining benches could be connected to a single or to a divided pipe, or two pipes could be used—one placed on either side of the buckstave. The design as finally worked out for a bench of eight retorts is shown in the accompanying illustration.

Stand-pipes, rectangular in section, are arranged on either side of the buckstaves, and are connected to the adjoining rows of retorts. The stand-pipes of each bench are sealed above in a wash-box or seal-tank, and below in a concrete trough extending the length of the house and enlarged into a tar-well at one end. The gas from the various wash-boxes is collected into an overhead foul-main, and is taken from the retort-house by an exhauster worked in the usual manner. A vacuum of 0·2 inch is carried. The circulating system is operated as follows: The pump used forces the hot liquor from the lower trough or seal to an overhead tank. The liquor then flows, through the various funnels shown, into and through the stand-pipes to the lower seal, where it is again picked up by the pump. There are two float-valves to control the ordinary town water, and one on the condenser water-supply line. Either water supply can be used to replace tar pumped from the lower seal to the storage.

Our experience has demonstrated that the bridge-pipes will not stop up. Hence the adoption of the standard steel pipe and elbow in lieu of the usual bridge casting. The dip is also made of standard steel pipe. The overflow seal-box has a drain controlled by a quick-opening valve. The waste is sealed in a pot, which serves a double purpose. If the exhauster should stop, the seal would blow and thus relieve back-pressure. This pot also enables the operator to know when the dip is sealed, for when the pot overflows it is a sure indication that the liquor in the seal-box is overflowing the weir, the top of which is above the lower end of the dip-pipe. The overflow liquor passes through

THE CONGDON SCRUBBER STAND-PIPE SYSTEM—PATENTED 1914.



SCRUBBER STAND-PIPE FOR A RETORT-BENCH OF EIGHTS.

the safety seal and into the stand-pipe, discharging into the lower trough.

When ready to charge, the dip-pipe is sealed to prevent the drawing-in of air. As soon as the charge is made, the valve is opened, and the level of the liquor inside the seal-tank or wash-box falls. When, however, it is desired to charge the retort again, the valve is closed, and water is admitted until the seal-pot overflows. The sealing and unsealing operations are accomplished from the charging-floor by means of the extension valve-stems. Tar is drained from the seal-tank, and flows to the lower trough through a pipe which is sealed in the trough and is provided with an appropriate valve. Once a day we draw off the tar by opening this valve. When liquor shows at the test-pipe, the valve is closed.

Many engineers have visited our plant, and all have been greatly impressed with the condition of the valves and the inside surface of the stand-pipe, which appears to have just been painted. Not a valve has given any trouble. Each has served the purpose for which it was adopted—viz., the prevention of waste of gas from the stand-pipes during charging periods. Also, as no gas escapes to burn at the mouthpieces, the men are not subjected to the great heat which they would otherwise have to endure were the valves omitted, and because the valve is on the stand-pipe end of the connecting-pipe they can see what they are doing when cleaning the retort stand-pipe connections. The closed valve prevents the dry dust from falling into the stand-pipe, and gas from blowing out.

To show the effect of discontinuing circulating the liquor, a test was made covering a period of three hours, and no liquor circulating showed the temperature in the stand-pipe to be 700° Fahr. The circulating system can be discontinued for several hours without causing any trouble. Since operating the scrubber stand-pipe system, we have sent through each pipe 2 gallons of liquor per retort per minute, though tests indicate this quantity to be much in excess of the actual need. As our plant is now arranged, the pump forces the liquor against a head of 54 feet, in transferring the liquor from the lower to the overhead tank. This head can be reduced by at least 15 feet. The theoretical horse power now required is 2·7; the actual horse power, based on 50 per cent. efficiency, is 5·4.

Operating Results.

Yield of gas per pound of coal—	
First seven months of 1914	4·85 c. ft.
,, ,, of 1913	4 80 ,,
Illuminating power—	
First seven months of 1914	16 07 candles.
,, ,, of 1913	15·20 ,,
Candle feet—	
First seven months of 1914	77·93
,, ,, of 1913	72·96
Yield of tar per short ton of coa in 1914	13 gallons.
Tar estimated in 1913	13 ,,
Yield of ammonia per short ton of coal—	
First seven months of 1914	4·16 lbs.
,, ,, of 1913	4·24 ,,
,, ,, of 1912	3·15 ,,
,, ,, of 1911	2·95 ,,

Note.—The Pratt Laboratory, of Atlanta, on Sept. 14. 1914, made a 24-hour test to determine the ammonia in the crude gas, and reported 5·62 lbs. per ton.

These results were obtained from a cheap grade of coal. The cost of coal carbonized per 1000 cubic feet of gas made, on an average for the first seven months of 1914, was 26·36 c. As we operate without seal, there can be no doubt that some gas is saved on this account. The candle power and the thermal value have shown a gratifying increase. The general improvement in ammonia results is probably due to a number of causes; but at least our stand-pipe system has not proved detrimental to the yield of ammonia, and it possibly is responsible for some of the improvement shown.

Didier-March Company (Mr. G. A. Balz).

The general principles underlying the design of the Glover-West system of continuously-operating vertical retorts were set forth in the last report of the Committee. During the period intervening since that date, some alterations have been made in the design of the apparatus tending to increase the gas-producing capacity of the benches, and further to simplify the duty of the retort-house operators. These latter improvements were confined to the stand-pipes, upper mouthpieces, and collecting mains, to provide greater facilities for the removal of any heavy tar that might, under certain conditions, tend to accumulate when carbonizing certain coals.

Within the past twelve months, installations of Glover-West benches have been completed and put into operation at Fitchburg (Mass.) and Pawtucket (R.I.), the former consisting of one bench of eight retorts, and the latter comprising four benches of eight retorts each; the two installations being designed for a capacity of 250,000 and 1,000,000 cubic feet daily capacity respectively. An installation of four benches of these retorts is now rapidly nearing completion at Portland (Me.).

An installation now in course of construction at Springfield consists of six benches, divided into two units of three benches. Each of these units is constructed immediately adjacent to the present retort-house, containing benches of inclined retorts. The vertical-retort installation is designed along such lines that future connection of the two units can be made by the construction of additional benches on the site that is now occupied by the inclines. When ultimately completed, continuous verticals with a total daily capacity of 1,500,000 cubic feet will be installed on an area now occupied by inclines of 1,000,000 cubic feet capacity, with a considerable area still unoccupied.

Isbell-Porter Company (Mr. J. S. De Hart, Jun.).

Since writing the last report on the continuous carbonization of coal in vertical retorts, new plants have been built and set in operation at Holyoke and Brockton (Mass.), Derby (Conn.), and Schenectady (N.Y.). The retort-house at Holyoke has a skeleton steel construction covered with metal lath and concrete. The house is 62 ft. 5 in. wide by 77 ft. 3 in. long, and will have a capacity for 1,500,000 cubic feet of gas per day when completely filled. The present house has six benches, each of a nominal capacity of 125,000 cubic feet per day, with room to duplicate. The retorts are oval in cross section, made of solid clay rings, arranged four retorts to a bench. Two retorts in any bench may be closed down to take the fluctuations in the output.

The second Derby installation has a nominal capacity of 500,000 cubic feet in four benches, and is practically a duplicate of the old house, except that the retorts are made of sectional silica blocks. The extended house contains eight benches, and is 34 feet wide and 120 feet long. The coal is crushed and elevated by a gravity discharge conveyor in this type of house. The coke is discharged cold, without quenching, into industrial cars, and raised by platform elevators to the yard storage trestle or sizing plant. The labour required to operate a plant of this type, making 500,000 cubic feet of gas per day, consists of a top man to charge the magazines above the retorts, and two men to discharge the coke from the hoppers at the bottom of the retorts on each shift. The bottom men also take care of the furnaces. A man is required for two or three hours each day to deliver coal from the storage or cars.

The Brockton house consists of four benches of 250,000 cubic feet each. Each bench has four rectangular ovens or retorts built of section blocks. Dampers are arranged so that one or more retorts may be used at a time. The house is 34 feet wide by 85 feet long, and is of substantial brick construction.

The Schenectady plant is similar to the Brockton installation, except that five benches, of a total capacity of 1,250,000 cubic feet, are installed. The coal and coke conveying plants for these two installations consist of 24 inch by 24 inch Peck carriers encircling the house and coke plant. The coke is discharged cold, without quenching, from hoppers built under the ovens, directly to the conveyor, and elevated either to the bunkers above the producers or to the coke plant. The coal is taken from a track hopper to a crusher, where it is broken to 2 inches or smaller. It is delivered to the Peck carrier at one end of the house, and elevated to bins above the retorts. Coke and coal are weighed on a Merrick scale at the top of the house, and recorded on separate counters. The labour to operate a plant of this type, making 1,000,000 cubic feet of gas, consists of a top man to charge the magazines above the retorts, one man to discharge the coke from the hoppers at the bottom of the retorts on each shift, one conveyor man, and one furnace man on the day shift. A man is required three or four hours each day to take coal from the store by locomotive crane or directly from the railroad cars.

In the Schenectady installation, the space between the coke plant and the retort-house is used for yard storage, the coke from which may be reclaimed into the Peck carrier. The houses are free from smoke and steam, due to the cooling of the coke before discharging. There is not the ordinary wear and tear on the machines and conveyors, which is unavoidable in discharging hot coke.

United Gas Improvement Company (Mr. J. H. Taussig).

The 1 million cubic feet coal-gas plant recently completed by the Stone and Webster Engineering Corporation for the Fall River Gas Company is the first unit of an ultimate development which provides for a possible daily capacity of 8 million cubic feet of coal gas and a like quantity of water gas. All the buildings, except the retort-house, are of fireproof brick construction with flat concrete roofs. The retort-house is built of 6-inch hollow tile, supported on a steel framework with a cement tile roof. By the use of wind-truss construction above the operating floor, the wind pressures on the building are carried to the foundations through the building frame, leaving an unobstructed space for the bench equipment.

The carbonizing plant designed and erected by the United Gas Improvement Company consists of seven benches, each containing nine retorts, arranged in rows of three. Each retort is about 18 feet long, 12 by 22 inches at top, and 18 by 30 inches at bottom (inside dimensions). The retorts, with the flues surrounding them, are supported on steelwork about 11 feet above the ground level; and just at the back of them are located the recuperator sections. In the rear of each bench the producers extend from the ground level to a height of approximately 13 feet. They are charged from the top with hot coke by means of buggies travelling on rails over the charging-door. Each bench has an individual hydraulic main with self-sealing cleaning pocket; and each hydraulic has a weak liquor feed, weir overflow valve, and balanced system of tar removal. The benches are usually operated at about an even seal. In the heating system, the "carbon dioxide return system" has been adopted.

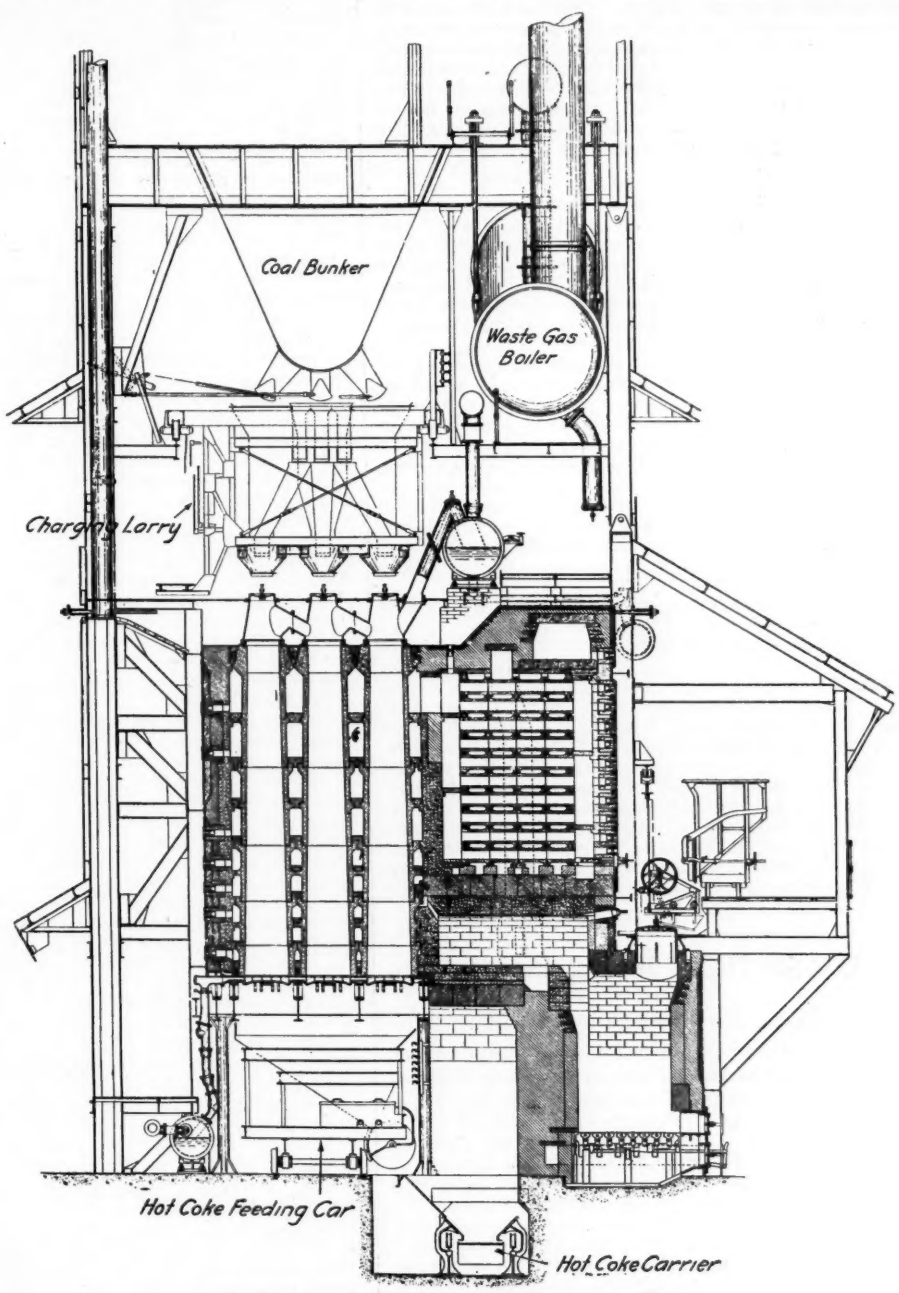
Ground was broken for the new plant in April, 1913, and on May 3, 1914, the first retort was charged. About two months were spent in adjusting the equipment and general tuning-up, and on July 13 a thirty-day acceptance test was started to establish the guarantees made by the bench contractors. During this test,

no unusual methods which could not be followed in regular operation (such as excessive temperatures in the benches, &c.) were used to increase the performance. The ¾-inch screened coal used during the test contained an unduly large proportion of slack, which probably affected in an unfavourable manner the efficiencies obtained. The average results of the test are as follows:

Coal as charged	6,113,728 lbs.
Moisture in coal	2·20 p. ct.
Dry coal carbonized	5,979,495 lbs.
Ratio of total coke to coal as charged	70·6 p. ct.
Ratio of total dry coke to dry coal	+71·6 ,,
Bench fuel, coke, as charged	848,522 lbs.
Ratio of bench fuel to coal as charged	13·88 p. ct.
Ratio of bench fuel to dry coal	14·19 ,,
Gas per pound of coal as charged	5·314 cub. ft.
Ditto dry	5·434 ,,
Illuminating power by Sugg "D" burner	16·71 candles.
Total gas made, corrected for temperature, barometer, and holder pressure	32,491,200 cub. ft.
Candle-feet per pound of coal as charged	88·80
Candle-feet per pound dry coal	90·80
Ammonia produced per net dry ton	7·30 lbs.
Tar (inc. 2 p. ct. H_2O) produced per net dry ton	14·70 gallons.
Average specific gravity of gas	·4355

The retort-house labour consists of two regular operators on each of two twelve-hour shifts. One other extra man is brought in during the periods of decarbonization, which appear to be necessary about every four to six weeks. It is believed that in future operations can be arranged so as to dispense with this extra help. Other labour is required regularly to fill the overhead bunkers with coal and coke breeze, remove and screen ashes, and clean out the conveyor trench and hydraulics. The coke produced from the plant is of excellent structure, good colour, and so large that it is difficult to quench until it has been crushed to size. The quantity of breeze made is noticeably small. The tar is thin and easily handled, as it contains only traces of naphthalene.

The Hartford plant, completed in May, 1914, is of the vertical retort type, operated intermittently, installed by the United Gas Improvement Company. It consists of seven benches of nine retorts each, placed in rows of three, so that three retorts are worked simultaneously. The accessory equipment includes a producer for each bench, operated under positive pressure by turbo-blowers located at the top of the retort-house. The producers are placed at the rear of the benches, and are provided with shaking grates, and designed to be charged with hot coke from a hand car, filled from the hot coke storage bin at one end of the furnace-charging level. Each bench has independent upper and lower hydraulic mains, through which weak liquor is kept circulating at all times; the large main on the top being equipped with a tar displacement system. There are three take-off pipes to each bench, each pipe taking the gas from three retorts. A very light seal is carried normally, which is increased when the retorts are open for charging or scurfing. Coal-storage bins over the retorts are designed to hold sufficient coal for 48 hours' operation, and contain also smaller bins for the storage of coke breeze, of which a little is dropped in the bottom of the retorts to protect the lower doors. Below the retorts is the hot-coke car, of heavy steel construction with cast-iron plates. A boiler located on the top floor utilizes the heat of the waste gases from the various benches, and supplies steam to the pumps and turbines.



VERTICAL RETORTS AT HARTFORD, CONNECTICUT.

A test was conducted by the builders in order to prove their

guarantee. It produced the following average results, when using "Harry B" Fairmount coal:

Gas made in 24 hours	1,132,000 cub. ft.
Yield per pound (dry basis)	5·37 ,,
Length of charge	11·50 hours.
Total coke made per ton (dry basis)	1357 lbs.
Coke per ton, bench fuel (dry basis)	263 ,,
Illuminating power, Sugg "D" argand	17·98 candles.
Candle-feet per pound of dry coal	96·63
B.Th.U. per cubic foot	635
Ammonia per ton, tested at foul main (dry basis)	7·08 lbs.
Tar made per ton coal (dry basis)	14·39 gallons.
Power developed by waste-heat boiler	95 H.P.

These results were obtained under conditions of a guarantee test, and consequently do not allow for some of the operating conditions, a very important one of which is scurfing. Normal operation requires the labour of a man on the retort-charging floor, and another at the bottom of the retorts. Additional labour is required to draw and screen the coke from the ash-pits, clean the hydraulic mains, operate the coal-conveyor, and clean the lower pipes and doors while scurfing. There is also a man to look after the boilers and turbines, and to take hourly readings.

Occasional trouble has been encountered by reason of the failure of carbonized charges to drop. This has been caused by the difference in temperature in different sections of the retort, by the accumulation of carbon along the sides, and by the use of damp breeze in the bottom. The lower doors and take-off pipes tend to become fouled easily, and are difficult to clean; and this causes leaks at the bottom of the retorts. The coke produced by this plant is of large size, light grey in colour, and much harder than the coke produced in horizontal settings.

KOPPERS COMPANY (MR. C. J. RAMSBURG).

The plant of the Koppers Company is complete for making either illuminating or fuel gas and for the recovery of all bye-products. From the standpoint of gas manufacture, two features are of interest: (1) The beginning of the construction of 56 Koppers bye-product coke-ovens for the Laclede Gas Company of St. Louis. (2) The starting of the bye-product coke-oven plant for the Maryland Steel Company, supplying gas to the Consolidated Gas Company of Baltimore.

The original plant contracted for at St. Louis was for 56 13¼-ton cross regenerative coke-ovens. A change has been made in this, in that the battery will be "combination" instead of straight coke-ovens. This means that the construction will be altered so that producer gas may be used to effect the carbonization, if at any time it seems desirable to do so. When operated as a gas-oven plant, if producers should be later installed—on first-class gas coal, working 18 hours' coking time—this plant would have a daily capacity of approximately 10,500,000 cubic feet. It may be also so arranged that any oven may be made to operate as either a coke or a gas oven, so that the production of gas may be varied nearly 100 per cent., from all-coke ovens to all-gas ovens. The construction of this plant is under way, and it may be expected to be in operation in the spring of 1915.

The Maryland Steel Company's plant consists of 120 13¼-ton cross regenerative coke-ovens, erected in two batteries, operating to make coke for the Company's blast-furnaces. It is equipped to separate the gas into rich and lean. A small plant is operated to remove a portion of the benzol from the lean gas, and to add this to the rich gas for increasing the candle-power. The plant is also equipped with the Koppers direct process for the recovery of ammonia. On account of general business conditions, only one of the batteries has been started; and this is working on about 25 hours' coking time, there being no necessity for a larger coke production. The operation has been successful beyond expectation; and a yield of rich gas, amounting to nearly 5600 cubic feet of 630 B.Th.U. per net ton, measured at the end of a twelve-mile pipe-line at Baltimore, is secured.

LONDON AND SOUTHERN JUNIOR ASSOCIATION.

Visit to Messrs. George Glover and Co.'s Works.

That the fixing of dates in mid-week for visits to manufacturing works (so that operations may be seen in full swing) does not deter members of the London and Southern District Junior Gas Association from turning up in good force was proved last Thursday afternoon, when there was a large muster at the Ranelagh Meter Works of Messrs. George Glover and Co., Limited, in Royal Avenue, Chelsea. Seven years ago, to the month, members of the Association assembled in the same works in response to a similar invitation by the firm; but many who were present last week in recalling the previous visit were surprised to think that it took place so long ago. This conclusively shows that the impression made was a lasting one; and time will surely prove the same remark to apply with equal truth to the second inspection—which was made under the painstaking guidance of Mr. J. W. Glover (the Managing-Director), his son, Mr. Albert Glover (who is a Director of the Company, and their Works Manager), Mr. A. Lyon, Mr. W. Cox, and other members of the staff. Mr. Walter Staples (another Director) and Mr. H. M. Thornton (the Managing-Director of the Richmond Gas Stove and Meter Company) had also hoped to be present, but were prevented.

At once, on reaching the works, the party were conducted to the commodious men's reading-room, which had for the occasion been fitted up with specimens of all the latest designs of Richmond gas-fires. Many of these were in action, and their genial warmth and handsome appearance were much appreciated; while there was, of course, ample opportunity for noting how effective in operation is the firm's new silent burner. This burner, and the fires also, were so recently fully described and illustrated in the "JOURNAL" [Sept. 29, p. 710] that it is unnecessary to say more about them here; but it may be remarked that all information desired was given to the members by Mr. Wicks and Mr. Burdis, who were present on behalf of the firm.

Before starting on the tour round the works, the party had the pleasure of listening to some remarks by Mr. J. W. Glover which assisted them greatly to a full understanding of all that they afterwards saw. After offering them, on behalf of the Directors, a very cordial welcome, he said the firm took it as a compliment that the Association should have found time to honour them with a second visit, notwithstanding the many counter attractions of the great Metropolis. Two years before the previous visit, the firm had constructed in these works two of the largest dry meters ever made in this country. They were both of them 3000-light meters; and he understood that they had been working satisfactorily ever since. As regarded the life of large dry meters, the best-known example was that of the 1000-light one made by their firm, which was fixed in St. Thomas's Hospital, where it worked for thirty years—in fact, until it was no longer required. The firm then purchased it for a small sum, fitted it with new diaphragms, and showed it at the Dublin Gas Exhibition. Afterwards it was sold as a second-hand meter; and it was, he thought, still at work.

Further referring to the life of dry meters, Mr. Glover said there was no doubt that in numerous instances they lasted quite as long as they formerly did, for the materials were as good and they were as carefully made and adjusted. There were, however, many cases in which they did not last so long as formerly, because of late years there had been changes made in the manufacture and distribution of gas which tended to shorten their lives. Greater heats were used in the distillation of the coal, often resulting in the formation and deposit of naphthalene in the meters. The deposit of naphthalene in the mains frequently gave occasion for the use of solvents, which in their turn were condensed and deposited in the meters. The enrichment of water gas gave a combination which was more liable to condensation. Higher pressures were generally adopted in distribution, enabling more gas to be passed through the meters. Hence they were more liable to be seriously overworked. The increased use of gas appliances—cookers, fires, water-heaters, and the like—caused the meters to be worked for longer hours than was at one time usual, and often also to be overworked.

Attention should be given, too, to the position in which meters were allowed to be fixed. Such positions as damp cellars, urinals, stables, washhouses, entries in passages subject to currents of air playing on the meter, and out of doors exposed to weather and extremes of temperature, gave rise to corrosion of the outer case and to increased deposit from condensation, and incidentally caused loss of measurement, to the great disadvantage of the gas undertaking. Measuring gas at a temperature of between 30° and 40° Fahr., instead of 62°, involved a loss of 5 per cent. in measurement, thus increasing the unaccounted-for gas. The remedy, of course, was to fix meters indoors, in a comfortably warm position. Care was also required in the storing of meters when out of use. If they were stored in an open yard, corrosion of many of the metal parts was set up, if there was any moisture in the meter or in the atmosphere, and if the meters were not corked-up. Hardening of the leather occurred when it was no longer protected by immersion in the gas. The remedy was to store under cover and soundly cork-up all meter-connections, to prevent the deleterious action of the atmosphere. The suggestion made by Mr. Hewett in the course of his recent Presidential Address,* that vacuum extractors might be used to get rid of the naphthalene in gas-pipes, had greatly interested him, as it seemed to him to be both a new and a practicable idea.

The firm of George Glover and Co. was, he continued, founded by his uncle, Dr. George Glover, in 1861; and he had the satisfaction of assisting him at that time. They exhibited several of their meters at the International Exhibition in London in 1862; and for six months he attended daily at the exhibition, where they received the award for superior construction and sound workmanship. This character they had ever since endeavoured to maintain. Since that time, the firm had received the highest awards at the principal international exhibitions at home and abroad. Mr. Glover added that his son (who had been with the firm for over a quarter-of-a-century) joined him in welcoming the Association to the works. In conclusion, he drew attention to some of the more noteworthy features of the works and manufactures—emphasizing the fact that everything in the works is connected with the dry meter, which is the one thing to which the firm devote the whole of their attention.

Thus well primed, the members were conducted round the manufacturing plant, which is situated in a large two-storeyed building, and is divided into the various requisite sections for the making of the different parts required in the building-up of the meters. The front portion of the building on the ground floor is arranged for the storing and despatch of the finished articles;

* See "JOURNAL" for Oct. 27, p. 188.

and in connection with this part of the business, the members were able to see on Thursday a 300-light meter start away from the yard in one of the Company's powerful motor-vans. In the back part, also on the ground floor, are heavy stamping machines of the most modern design for stamping-out the steel and tin-plate parts of the meter. In manufacture only Staffordshire charcoal tinned plates are used—for small meters to the firm's own sizes, and for large ones in sheets 6 feet long. Other space on the ground floor is occupied by the gas-engines which are employed for furnishing the motive power of the presses and the lathes, as well as for providing the air pressure for testing and for the tinmen's stoves, in which gas is now used, instead of charcoal as in the old days. For melting metals in the foundry gas is utilized in a "Richmond" crucible furnace; and in this connection it may be pointed out that the meter valves and gratings (made of a tin and antimony alloy) are cast separately in steel moulds.

On the first floor is the shop containing the semi-automatic lathes for producing the various parts, and also some special machines (of French design) for the production of parts of the slot-mechanism. Much time was spent in this portion of the works (which the members found of absorbing interest) and the floor above, which contains the light brass finishing lathes. In the assembling shop, the visitors also lingered; and the important matter of leathers was by no means overlooked. For the diaphragms of their meters the firm use Persian sheep-skins sewn with white silk; but it was impossible to show the sewing in process, as this is done by widows, wives, or daughters of the workmen in their own homes. Mr. Glover remarked that he had heard it suggested that one could not now procure leather so good as formerly. He, however, believed, on the contrary, that it would have been impossible thirty or forty years ago to have obtained skins so suitable as those now procurable, which were specially prepared, very tough, and close in the grain.

The last department visited was the proving-room—a separate building, in which the testing of the meters is carried out preparatory to them being despatched or put into stock. Here all the meters are carefully regulated, and each one is tested for soundness at 12 inches pressure, at ½-inch pressure as prescribed by the Sales of Gas Act, and at 3 inches pressure and full outlet capacity, with the object of preventing slow registration even when overworked. During the tour, many empty benches were noticed—a state of affairs which, it is gratifying to learn, has arisen through some thirty or forty of the men having joined the Colours.

As was pointed out by Mr. Glover, the firm make dry meters, both large and small, for ordinary and prepayment consumers. They also manufacture a stop, or key, meter, such as is used by certain gas undertakings. The strong and substantial slot movement is claimed to be one of the simplest in the market. All brass parts are standardized and interchangeable; and a feature of the movement is the rotary coin-pocket interlocking with a Geneva stop-wheel, which can only be actuated by a coin of the proper size. The movement is readily adaptable for pennies, shillings, sixpences, half-crowns, or for foreign coins in some cases smaller in size than a threepenny-piece. Attention was called by Mr. Glover to the number of parts in a meter; and he showed a case in which there were over 180 parts going to make up a three-light slot-meter. If, he said, the members would multiply this by all the sizes of meters made by the firm, up to 3000-light, they would immediately recognize that in no one visit would it be possible to find the men making every part at the same time. They would, however, always see them making the index, for the men engaged on this work are specialists, and do nothing else. There was seen a coin-counter for attachment to meters, showing how many coins are put into the meter. It was mentioned that a forty-year old meter had just come in, and that 24 years had elapsed since it was repaired.

The inspection over, members found tea awaiting them in the reading-room; and here the President (Mr. J. Hewett) expressed his appreciation of the kindness that had been shown to the Association. The visit, he added, had been both pleasurable and profitable. Everything they had seen appeared to be made of thoroughly substantial material, and first-class workmanship was put into it. These two factors went to make up a good article. Mr. S. B. Chandler proposed a hearty vote of thanks to Messrs. Glover and to the members of the staff who had conducted them round; the proposition being seconded by Mr. W. E. Brown and heartily carried. Mr. J. W. Glover, in returning thanks, said that it was difficult with so large a party to show all there was to be seen; but if at any time individual members cared to come to the works, the firm would be happy to explain all they could to them.

Technical Gas and Chemical Analysis.—We have received from Messrs. Gurney and Jackson, of Paternoster Row, E.C., "Technical Gas Analysis," by Dr. George Lunge, Emeritus Professor of Technical Chemistry at the Federal Polytechnic University, Zürich; and Vol. III. (in two parts) of "Technical Methods of Chemical Analysis," by the same author and Dr. C. A. Keane, the Principal and Head of the Chemistry Department of the Sir John Cass Technical Institute, London, in collaboration with a number of English and foreign technicians. Fuller notice of these valuable volumes is reserved for a subsequent issue. Meanwhile it may be mentioned that the price of the one first named is 15s. net, and that of the two parts of the other work £3 3s. each.

IS THE REDDENING OF MEAT DUE TO GAS COOKING?

A short paper was read by Dr. Schumann, of Munich, before the last meeting of the Bavarian Association of Gas and Water Engineers at Bayreuth. He reported the results of a study he had made of the causes of the red colouration which is sometimes found round the margin of a cut of either boiled or roast meat. His paper has been printed in the "Journal für Gasbeleuchtung."

It appears that not infrequently new users of gas-cookers have complained that this red colouration, which spoils the appearance of the cooked meat, is due to the cooking having been performed by gas; but Dr. Schumann's investigation shows that the reddening, when it occurs, is in no way caused by the use of gas. It frequently occurs in meat cooked by coal or wood ranges, and in meat cooked in closed vessels. It is the exception rather than the rule in meat cooked by gas.

The red margin on cooked meat may be produced by the action of certain saline solutions—solutions of nitrites in particular—on the raw meat. If meat is boiled in water containing seven parts of sodium nitrite per ten million parts of water, the red colouration will be found when the meat is cut. The depth and intensity of the red margin increase with the quantity of the salt and the time of exposure of the meat to it in cooking; but quite small traces in the water suffice to spoil the appearance of the cooked meat. Other salts which can cause the reddening are sulphites and nitrates; but larger quantities and longer exposures are required with these to give the same effect as with nitrites. The redness is due to the salts entering into combination with the colouring matter of the blood; and the combination is not found to be destroyed by heat.

In practice, the colouration is probably caused in most cases by the contact of the meat with ice during storage. Water very commonly contains traces of nitrites, which remain in the ice produced from it. Also in preparing meat for cooking, it may be cleaned with water containing traces of nitrites. The nitrites in the ice or water combine with the colouring matter of the blood in the outer layer of meat, which, after roasting or boiling, is found to have a red edge when cut.

In a later issue of our contemporary it is pointed out, in connection with this question, that Dr. Klut last year, in a communication in the "Proceedings of the Royal Institute of Water Hygiene," recorded some investigations which he had made. He found that town water supplies which coloured meat (beef especially) pink or red on cooking contained nitrous acid. More than the merest trace of nitrites—viz., 0·8 part of N_2O_3 (= 1·5 parts of sodium nitrate) per million of water—caused the colouration on cooking, even though the meat had only been left in the cold water. Water containing free carbonic acid and nitrates, if supplied through galvanized iron pipes, gives this red colouration, owing to the nitrates being partially reduced to nitrites by the zinc coating on the pipes. Dr. Klut recommends that in such cases the water should be allowed to run to waste for a short time before being used.

MANSFIELD'S AUTOMATIC WATER-FINDER.

Success on Canadian Farms.

In previous issues of the "JOURNAL," reference has been made to the above-named apparatus, by means of which, it is claimed, any unskilled person may readily ascertain whether or not a subterranean stream or spring of water exists under a spot where boring operations are desired. The divining-rod has been the instrument hitherto relied upon for furnishing indications as to the presence of underground water; but although it has been successfully employed in many cases, it cannot be said to be absolutely reliable. The principle upon which the water-finder patented by Messrs. Edwin A. Mansfield and Co., of New Brighton, Cheshire, works is the indication of the existence of currents which flow between the earth and the atmosphere, and which, seeking the path of greatest conductivity, are always strongest in the vicinity of subterranean watercourses, the waters of which are charged with electricity to a certain degree. Testimony as to the value of the instrument has lately been received by Messrs. Mansfield from a farmer in Canada who purchased for £30 one of a size suitable for locating water at depths up to 200 feet. After being without water for nearly four years, he found it, and bored six holes from 20 to 100 feet deep at different places on the half section of the farm. Two more sources of water were located, and one well was bored to a depth of 50 feet—water rising to within 2 feet of the ground. The other well has not been sunk, but there are indications that a good supply may be expected. It cost the farmer $500 a year to convey water for his stock; and the work was attended with a great deal of mental anxiety, especially in winter. He reckons that the water-finder has paid for itself twice over. He adds that neighbouring farmers have spent hundreds of dollars in boring for water, and have obtained only dry holes. Now they would not think of boring unless water had been located by the "finder."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Capture of German Trade.

SIR,—The enclosed, which I read in the "Chemical Trade Journal" a few days ago, is so true, and so well expresses the reasons why the Germans have beaten us in certain chemical industries (such as the manufacture of coal tar colours and optical glass) that I send it to you, as I think it will interest your readers in view of the necessity on our part of more scientific specialization. Many contracts allotted to German firms are being cancelled, merely because they cannot supply; but if we are to maintain the business after the war, we must revise our methods. Otherwise, the unique opportunity to increase our trade will later be lost.

J. FERGUSON BELL.

Derby, Nov. 14, 1914.

[ENCLOSURE.]

EXTRACT FROM THE "CHEMICAL TRADE JOURNAL," OCT. 17, p. 327.

As Others See Us.

An eminent Danish chemist, interviewed by the "Standard" in regard to capturing German trade in chemicals, said: "British traders are weak in the essentials of capture. Two things are of paramount importance: (1) England must send out more and more competent commercial travellers at once; (2) the business side and the 'brains' side must be brought into closer contact in England."

I speak of what I know and what is common knowledge in Germany. In every great chemical industry in England the chemist is, as a rule, relegated to the laboratory with his bottles and test-tubes. He is an academic adjunct. In Germany you will rarely find a board of directors in which the chemist and the technical expert are not paramount—interwoven, as it were, into the vitals of the business. It is largely so in British engineering trades; but in the chemical industries it is not so. British chemists are the finest in the world. They have not been treated properly by the "business" side of their industries. They can make anything now made in Germany. Moreover, they can follow up with developments as is done by German chemists; but they must be in close touch with the "business" side.

Storage of Inflammable Liquids.

SIR,—On p. 284 of the "JOURNAL" for Nov. 10, you have an article headed "Storage of Inflammable Liquids." This article quotes a regulation prescribed by an Order in Council on Oct. 14, relating to the storage of petroleum and other inflammable liquids. This regulation, when considered together with your comment, is not particularly clear to me, as from the regulation itself it would appear that any oil, &c., which had not a flash-point lower than 73° Fahr. was exempt. But you say, further on, that you are informed that the regulation applies to all such oils whatever the flash-point may be.

So far as we are concerned, we only store about 40 tons of gas oil, which has, of course, a higher flash temperature than 73° Fahr. This quantity is stored right out in the country, in tanks above ground—one pair of tanks being about half-a-mile from the other; and if they caught fire or exploded, or anything of the sort, no harm could possibly be done to anybody. Do you take it that the regulation would apply in such a case?

Further, it would not, I suppose, be construed to include and extend to paraffin, lubricating oils, and so on, of which I keep comparatively small quantities, for engine-room purposes, in barrels. In the aggregate, of course, I have more than 100 gallons, but naturally have not got so much as this quantity in any one barrel.

It is sometimes difficult to understand how the Government desire one to interpret regulations which they issue from time to time; and if you could give me any advice arising out of any information you have, I should be very much obliged.

I cannot understand how the large stock of oil throughout the country which is now stored in steel tanks above ground can possibly be protected in the way suggested by the regulation.

HERBERT ASHLEY, Engineer and General Manager,
Borough of Portsmouth Water-Works Company.

Portsmouth, Nov. 12, 1914.

[Our correspondent is not alone in his confusion as to just what the Order in Council really means. But it is fully evident that it is intended to cover all oils of a flash-point higher than 73° Fahr. Again, though from the first it was considered that the wording of the Order was badly expressed, there is no doubt in the minds of many—in spite of legal advice to the contrary—that the regulation was intended to cover heavy oils; and this opinion was endorsed by the reply Dr. Lessing received to a letter he addressed to the Home Office on the subject. It is, however, hardly likely that the Government will strictly enforce the letter of the law. As to the last paragraph of Mr. Ashley's letter, the Order does not necessitate the bricking-in of the whole tank. Probably a low brick wall or an earth dam would meet the case if the enclosed area were large enough to hold the total contents of the tank or tanks at a comparatively shallow depth.—ED. J.G.L.]

Benzol Recovery in Germany.

SIR,—In your issue of Nov. 10, "J. A." asks, "What is a fact?" According to the dictionary, a fact is a reality.

Now it is an unquestionable reality that on every coke-oven plant in this country, with the exception of perhaps one or two in South Wales, where benzol is recovered from the gas, the yield obtained is approximately an average of 2½ gallons of crude benzol per ton of coal gasified. I had assumed in my letter appearing in your issue of Nov. 3 that gas engineers were by this time aware that only a comparatively insignificant portion of the benzol manufactured both in this country and in Germany is obtained from coal tar. There is evidently in the mind of "J. A." some confusion on this point. "J. A." can satisfy himself on the following figures: There are in this country approximately 6000 bye-product ovens operating in conjunction with benzol recovery plants. The average amount of coal carbonized per oven per annum may be taken as 1500 tons; and, on the basis which I have given, this will correspond approximately to the production of 22 million gallons of crude benzol per annum. The amount produced from coal tar probably does not reach 1 million gallons per annum.

Anyone taking the trouble to read carefully the remarks made by the "Manchester Guardian," and quoted in your columns, would see the absurdity of the statement. He says that in 1912 the German Government ordered a plant capable of producing 6 million gallons of benzol per annum. On the basis of 17 tons of coal to a gallon of benzol, this would mean a carbonization of 102 million tons of coal per annum for this plant alone. This quantity exceeds by no inconsiderable margin the total amount of coal at present being carbonized in coke-ovens in the whole of Germany.

It would be as well, therefore, if "J. A." would take the trouble to get a clear understanding of the position before attempting to be sarcastic at other people's expense, and before making such absurd statements as, "If Mr. Cooper is right one-fourth part of coal tar is crude benzol." I trust that he will now see the error of his deduction. If he will again read my previous letter, he will see that I made no mention of coal tar at all.

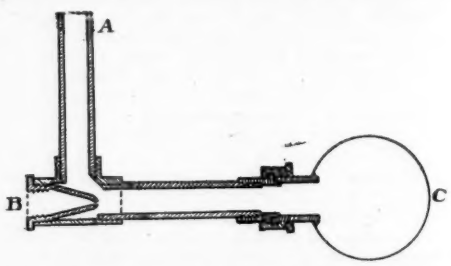
G. STANLEY COOPER.

Sheffield, Nov. 11, 1914.

Removing Naphthalene Deposits from Services.

SIR,—In his inaugural address at the meeting of the London and Southern Junior Gas Association [see "JOURNAL" for Oct. 27, p. 187], Mr. Hewett made some remarks on the naphthalene trouble. Certainly he is right when qualifying as totally wrong the generally followed method of removing naphthalene stoppages by using a force pump. But when in the course of his address he gives a hint that the vacuum cleaner principle might also be applicable to service cleansing, he might have added some further particulars concerning the plan, method, or apparatus used by him.

Therefore it might be of interest to readers of the "JOURNAL" for me to mention that at the International Gas Exhibition of Amsterdam (1912) there was shown an apparatus for the removal of naphthalene from services by the vacuum method. The apparatus was invented by van Waert, an employee of the fittings staff of the Amsterdam Gas-Works.



As is seen in the illustration, a short tube is screwed to the cross-leg of a T piece; the free end, A, of the tube being connected to the service. The second leg of the T has an inner injector cone, B, of sufficient length that it ends almost in the third leg of the T. The outside of the injector is provided with a screw-thread for connecting the service cleansing pump. The third leg of the T has a short tube with a coupling bearing a small linen bag C with narrow meshes.

Now, when by the service cleansing pump compressed air is blown into the injector, the working of the air-jet causes a vacuum in the tube connected to the service—a vacuum proportionate to the pressure of the compressed air. By this vacuum the naphthalene deposit is extracted, as is also the case with dust and rust particles; and after their extraction, they are blown by the air-jet into the linen bag, where the collected quantity allows a control on the working of the apparatus. The apparatus gives every possible satisfaction when the naphthalene and the dust are dry; but it is of practically no use when the deposits are wet.

D. STAVORINUS.

Amsterdam, Nov. 5, 1914.

Woodall-Duckham Vertical Retorts at Bolton.

SIR,—In the "JOURNAL" for Nov. 10, in my reply to Mr. Buckley, *re* clinkering, the following passage occurs: "Pricking was done every three or four hours, and there was a special workman to see to it. It was 'not a five minutes' job.'"

There is obviously a mistake here, which I shall be glad if you will correct. The sentence should read as follows: "Pricking is done every three or four hours; and there is a special tool for the purpose. It does not take more than five minutes."

ROBT. NEILL.

Bolton, Nov. 11, 1914.

Sliding Scale Conditions.

SIR,—The enactment of a new General Gas Act has been forecasted several times of late, and many matters of importance have been canvassed in relation thereto. One of some moment, however, has not been much in evidence—namely, the advisability of a fundamental alteration of the "sliding scale"—and it may be worth some little consideration.

All coal-mining authorities and interests agree in asserting that coal can never again be so cheap as formerly, but will have a constant

trend upwards in price; Mines and Miners Acts being given as the principal cause. Now if it be true that an increase in the price of the raw material, and therefore of the cost of gas manufacture is the inevitable consequence of specific legislation, the gas industry has at least as good a claim to have this taken into consideration by the Legislature as the railway companies had in a like case.

There does not appear to be any inherent difficulty to prevent the embodying in a general sliding-scale clause of provision for a standard price of coal, the exceeding of which should entitle a gas company to raise the price of gas a specified amount without affecting the dividend; and, while this would be but fair even though the absence of such power might have no very serious results, it has every appearance of becoming in the near future a vital necessity of the case, if henceforth the normal concomitant of high coal prices is to be low ones for coke.

Bridlington, Nov. 10, 1914. J. KELLY.

[The point raised by our correspondent is referred to in a paragraph on p. 348.—ED. J.G.L.]

LEGAL INTELLIGENCE.

REGISTRATION OF AN AGREEMENT UNDER THE WORKMEN'S COMPENSATION ACT.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISIONAL COURT.

Friday, Nov. 13.

(*Before Justices* DARLING, LAWRENCE, *and* SANKEY.)

The King v. Registrar of the Thetford County Court (*ex parte* **Brandon Gas Company**).

Mr. HOLLIS WALKER, K.C., and Mr. ELLIS HILL appeared for the appellants; Mr. BRANSON and Mr. SAMUELS represented the respondent.

Mr. SAMUELS said he appeared on behalf of the Registrar of the Thetford County Court to show cause why a rule *nisi* should not be made absolute for a mandamus directing him to register a certain memorandum of agreement made between the Brandon Gas Company and one John Stinton. The rule was obtained by the Brandon Gas Company as prosecutors. The facts were that on July 27, 1910, John Stinton was injured by an accident arising out of his employment with the Gas Company, and he lost a leg. He was permanently and totally incapacitated from work, and took proceedings in the Thetford County Court to recover compensation from the Company under the Workmen's Compensation Act. He was awarded 19s. a week; and the sum was duly paid to him up to March 14 last. Stinton was then 56 years old; and the amount required to purchase him a life annuity was £632 10s. 6d. Of this amount, £474 7s. 11d. (75 per cent.) was the maximum sum which Stinton was entitled to claim if the Company resolved to liquidate their whole debt under the Workmen's Compensation Act. Stinton agreed that the debt should be liquidated by a payment of £474; and on March 13 the Company paid to Stinton £474, and a receipt was given in duplicate. It was drawn in the form of a memorandum of agreement, so that it might be recorded by the Registrar in the Thetford County Court under the provisions of the Act.

Mr. HOLLIS WALKER, in supporting the application for a rule, said unless this memorandum were registered the Gas Company might be held liable for the amount, and grave injustice done to them. They might be deprived of the right to enforce it as against the plaintiff.

The Court, by a unanimous judgment, held that the Registrar was wrong, and directed that the rule be made absolute, but without costs.

SEQUEL TO A STREET-BOX EXPLOSION.

In the King's Bench Division of the High Court of Justice last Thursday, the case of *Goodbody v. Mayor and Corporation of Poplar* came before Mr. Justice DARLING and Mr. Justice SANKEY, sitting as a Divisional Court.

Mr. VACHELL, K.C., and Mr. HARTLEY appeared for the plaintiff; Mr. THORN DRURY, K.C., and Mr. A. F. CLEMENTS represented the defendants.

Mr. VACHELL said this was an appeal by the plaintiff from a judgment of his Honour Judge Bray, at the Bow County Court, after trial with a jury, who answered certain questions left to them, in favour of the defendants. The plaintiff contended that judgment ought to have been entered for him for £25, the amount of damages assessed by the jury. The facts were that in September last year the plaintiff was walking along Bow Common Lane when there was a sudden explosion in the footway, caused by the ignition of gas which had accumulated in one of the street chambers connected with the defendants' electricity undertaking. The result was that the cover of the chamber was blown off, and the plaintiff was thrown violently against a wall, sustaining certain injuries. The learned Judge left to the jury two questions: (1) Did the chamber constitute a nuisance? (2) Were the defendants guilty of negligence in that the chamber was improperly constructed? To both questions they answered "No." There was an adjournment, and the Judge then heard legal arguments as to how judgment should be entered. He declined to enter it for the plaintiff for £25; holding that he was bound by the findings of the jury. His (Counsel's) submission was that, on the facts admitted by the defendants themselves, it was quite clear, on the authorities, that the plaintiff was entitled to judgment. Negligence did not matter, nor did the nuisance. Having regard to the most recently decided cases, the action came within the principle of *Fletcher v. Rylands*. Defendants had brought a dangerous thing on to the highway or footpath. They had control of it; and if, in consequence of anything else whatever, even the act of a third person, the dangerous thing caused injury to anyone, liability followed on the part of those responsible for bringing the thing there.

Mr. Justice DARLING: Supposing the plaintiff had sued the gas company instead of the defendants?

Mr. VACHELL replied that, to be on the safe side, he should have advised suing both. The real causing agency, however, was not the presence of gas, but the sparks that were permitted to escape and cause the gas to ignite.

Without calling on the other side, the Court dismissed the appeal.

Mr. Justice DARLING said it was not contended for a moment that the mere destruction of the electric fuse, and the ignition of the spark alone caused injury to the plaintiff. It would not have caused any damage at all but for there being something in the box of the defendants which they had not put there, and which there was uncontradicted evidence to show they could not possibly have kept out. The gas had escaped from a main in which the defendants had no interest, and over which they had not the slightest control. If they had brought the gas there, and had failed to render it innocuous, he should have held that the case came within *Fletcher v. Rylands*. What was really contended was that the defendants, because they had something which might be dangerous if it came into contact with something else, were bound to compensate anyone who was hurt by that which they kept becoming ignited against their will, and without any possibility of their preventing it. The defendants were entitled by Act of Parliament to keep the box in question under the pavement. The jury having found that there was no negligence and no nuisance, there was nothing else on which the Judge could direct them to find for the plaintiff.

Mr. Justice SANKEY agreed, and added that it might be considered as unfortunate that the plaintiff had not thought of joining the gas company as defendants.

The appeal was dismissed, with costs.

PINTSCH FLASH-LIGHT PATENTS.

At the Patents Court, an application was recently made by the Pintsch Patent Lighting Company, of London, for the suspension in their favour of several patents for lighting apparatus owned by Julius Pintsch, of Berlin. It was explained that the patents referred to apparatus for flash-lights for marine and aerial purposes, for railway signals, and compressed-gas motors.

Mr. GRAY, for the applicants, said their position was that for a good many years they had an agreement with the German patentee which really made them the equitable owners. The applicants were an English Company, with a certain proportion of German shareholders. The proposal was that the Company should voluntarily go into liquidation and make a proper distribution of the assets, and start the business as an entirely British concern. He asked that they should be given an exclusive licence to manufacture without the payment of royalty.

The Court's recommendation will be laid before the Board of Trade in due course.

POSITION OF THE KOPPERS COMPANY.

Application for the Appointment of a Receiver.

In the Chancery Division of the High Court of Justice last Thursday, Mr. Justice WARRINGTON had before him an application for the appointment of a receiver of the business of the Koppers Coke-Oven and Bye-Product Company. It was made *ex parte* on behalf of Messrs. W. Edward Kochs and Co., of Sheffield.

Mr. ROOPE REEVE, who made the application, said that the matter was urgent, arising out of the existing state of war. Messrs. Kochs and Co. were a partnership firm, and the defendant was Mr. Heinrich Koppers, an alien enemy resident in Germany, who had never been in this country. The plaintiff firm consisted of one gentleman of British birth and another who was a German, and had been resident in this country for upwards of twenty years. He had applied for naturalization, but had not obtained it. Plaintiffs had carried on business as colliery engineers for twenty years, and twelve years ago they entered into partnership with the defendant for the exploiting of coke-ovens and plant for recovering bye-products. This business appeared to have been very successful; and at the present time there was a sum of upwards of £294,000 outstanding in respect of contracts that had been partly performed.

His LORDSHIP remarked that, from Counsel's statement, the case seemed to be one which would come under the Trading with the Enemy Act. It was a business which ought to be carried on in the public interest. It was not the usual practice to appoint a receiver without hearing what the defendant had to say, and in this case he could not be served. If the matter were represented to the Board of Trade, application could be made to the Court for a controller.

Mr. REEVE said if they could not get a receiver they must adopt the course suggested by his Lordship. He then read an affidavit by Mr. Kochs which set forth that the Company had contracts on hand for £294,438, and many of the firms concerned in these would be willing to continue business with them if they were assured that it would be right to do so in the present circumstances. The stoppage of the Company's business would throw 600 or 700 English workmen out of employment, besides indirectly affecting many more. As much as £50,000 was now being withheld, and would be got in if the firms owing felt that it would be right to pay the money.

His LORDSHIP: If you do not represent this to the Board of Trade, I will. It would be a manifest injustice to appoint a receiver against a man who cannot be served. The appointment must go on indefinitely. There is ample opportunity for obtaining what you want through the Trading with the Enemy Act. I will communicate with the Board of Trade, and send them the affidavit.

MISCELLANEOUS NEWS.

GUARDIANS AND A LIGHTING LOAN.

Under this heading there was reported in the "JOURNAL" for May 19 last (p. 514 the proceedings the previous week in an inquiry by Mr. T. C. Ekin, one of the Engineering Inspectors of the Local Government Board, regarding an application by the Islington Guardians for sanction to a loan of £3600 for the purpose of installing electricity in various institutions under their charge. The proposal was strongly objected to by the Gas Light and Coke Company, who claimed to attend as large ratepayers and the present suppliers of light to the premises concerned. Mr F. W. Goodenough gave very strong evidence against the proposal. We now learn that the Local Government Board have refused to grant the loan.

Referring to this matter and the recent Long Eaton judgment (on appeal), the November issue of the "Bulletin of the British Commercial Gas Association" states: "This, following upon the refusal of a loan by the Local Government Board to the Islington Guardians for the installation of electricity in their houses in the face of an offer and criticisms by the Gas Light and Coke Company, which no business firm would have ignored as did these 'guardians' of the poor, should help to teach the electrical industry that unfair and underhand methods of warfare are as unprofitable in commercial as in more desperate campaigns, and should encourage the gas industry always to prosecute a good case to the very end, despite all initial handicaps."

THE LONG EATON JUDGMENT.

Further Litigation Abandoned.

In a spirit of enforced contrition, the Long Eaton District Council have decided to save the ratepayers the cost of further litigation arising out of the case recently determined by the Court of Appeal [see "JOURNAL," Nov. 3, p. 249] regarding inequitable rates for electricity in competition with gas. There had been rumours locally of the intention to carry the matter to the House of Lords; but the electors made it pretty clear to their representatives that they are in no humour to tolerate further expense in a fruitless attempt to upset the decision of Mr. Justice Sargant, ratified by the Court of Appeal.

The subject was brought up for consideration again at a meeting of the Council yesterday (Monday) week; and in contradistinction to the policy previously adopted of discussing it behind closed doors, representatives of the Press were allowed to be present. The report of a Sub-Committee who had been appointed to deal with the situation was presented, and the best was made of the difficulties into which the Council had been landed by the acquiescence in the recommendation that there should be no more money wasted. The report did not phrase it exactly in these terms, but the meaning was clear. Despite the blustering which represented the Gas Company as being possessed of almost piratical designs, the Council had to confess themselves beaten; and when the accounts have to be settled, it is assumed that the legal costs will represent a larger amount than that which at present forms the estimate. The unwisdom of the whole procedure, as far as the Council are concerned, is rendered the more galling by reason of the fact that Long Eaton in its present state of trade can ill-afford the added burden occasioned by an ill-advised appeal. There were those in a minority in the Council who early warned their *soi-disant* colleagues of the dangers they were rushing to. Had the warning been heeded, the ratepayers would have been saved the burden of a heavy bill.

The Sub-Committee's report was in the nature of a sop to Cerberus; and in the subsequent discussion one councillor used a phrase [not here reported] which went perilously near to contemptuous language regarding two of His Majesty's Judges. The Sub-Committee recapitulated facts in detail as to the appeal, premising that they considered it was essential in the interest of the Council that the very best assistance and advice should be obtained in support of their case. With this end in view, Mr. Vesey Knox, K.C., a specialist in the law relating to electricity undertakings, was briefed upon the appeal, together with other counsel who had appeared for the Council at the first hearing. The Sub-Committee's report, in its somewhat ill-adjusted summary, adds:

> The Court held that there was no legal reason to justify a differentiation in charges between two consumers in the same circumstances, who might possibly take the same quantity of electricity, because one had a wing or small factory lit by gas or acetylene, and that such differentiation was a breach of the provisions of the Electric Lighting Acts prohibiting undue preference.
>
> The Sub-Committee desire to point out that the object of the circular was to prevent a consumer who took a very small portion of his light from the Council from claiming the benefit of the reduced price of ¾d. per unit, against 1d. The Court held that the effect of this condition was to oust competition with the Gas Company in respect of lighting; and it was therefore illegal. The case was decided entirely upon the circular; and the appeal was dismissed.
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> The Judges did not enter into any other question in the case, and, as far as this decision goes, *it does not settle* [the italics are ours] the important question raised by the Council, that the consumer taking power was not taking a supply under similar circumstances, and his supply did not correspond with a consumer taking power and light, and that the Council were entitled to charge the two consumers different rates. The question of the right of local authorities to offer competitive terms to customers is not touched by the decision.
>
> The Sub-Committee are informed that another case is pending in which it is hoped that the latter question will probably be fought out to a finish, and in which a definite pronouncement is expected to be made. It has been suggested to the Sub-Committee that these questions should be further considered, and that the matter should be laid before the Urban District Councils Association and the Association of Municipal Electric Suppliers, who are interesting themselves in the other case which is about to be heard. The plaintiffs' costs of the action in the Court below have been taxed and allowed at the sum of £315 8s. 8d.; and this amount has been paid to the solicitors of the plaintiffs, and their receipt obtained. The whole of the costs of the case will be met out of the unappropriated profits of the undertaking, which amounted to £3134 on March 31, 1914.
>
> The appeal having failed, the Council are faced with the difficulty of re-organizing their scale of charges; and in view of the decision given, this will require very careful consideration by the Electricity Committee. The Engineer is giving the matter attention, but is for the moment unable to recommend a system of charging which will meet the varying customers of the Council.

Obviously it was not a very palatable task which fell to the lot of Councillor TRUMAN, who had been deputed to move the adoption of a report replete in confession of errors of judgment. He admitted, however, that they deplored the result of the appeal, adding that while this was the feeling they had the consolation of knowing that to the best of their judgment they had done what they deemed to be essential in the interests of the town. There had been reasonable grounds for anticipating that the judgment of Mr. Justice Sargant would not be upheld when it came to be submitted to the Court of Appeal. Relative to an acetylene lamp being used in an office, he thought the suggestions contained in the contentions were childish and absurd. It had been said that the action was, in essence, an attempt to oust the Gas Company; but he denied that this was the prevailing motive. They were justified in risking something to know where they stood. Would the Clerk reassure the ratepayers that the costs would not exceed £1000? He (Mr. Truman) entertained the view that there was hardly any danger of the cost exceeding four figures; and therefore the rates need not necessarily be increased.

Mr. BUSH expressed the eminently practical idea that it was better to pay the bill and say very little about it. He thought, however, that even now they had more "learned men" (*sic*) in Long Eaton than in London. There came in Mr. Bush's speech also the admission that it was "piffle" to say that the money would not come out of the rates. The ratepayers would have to pay indirectly.

Mr. E. WILLIAMS, the Clerk to the Council, assured the meeting that the costs of the appeal and the action would not exceed £1000.

Mr. RICHARDSON expressed the opinion that it was "sheer suicide" upon the part of the Council to enter an appeal against Mr. Justice Sargant's judgment, for the Council never had a leg upon which to stand to justify their action. He had always been an opponent of the preferential system of trading in relation to the electricity undertaking; and he warned the Council that it would be better for them to put their house in order before injunctions compelled them to do so. It was quite within the range of probability that they would now have to deal with other claims.

The report was adopted; Mr. Richardson voting against its acceptance.

So, adds our correspondent, the miserable *debâcle* has ended, illustrating the Long Eaton Council's want of perspicacity.

TORONTO CONSUMERS' GAS COMPANY.

The Sixty-Sixth Annual Meeting of the Consumers' Gas Company of Toronto was held in that city on Monday, the 26th ult.—the PRESIDENT (Mr. A. W. Austin) in the chair.

In the report presented, the Directors expressed their pleasure at being able to exhibit increases in the consumption of gas, in the number of consumers, in gross revenue, and in net earnings. That these results had been realized, notwithstanding the keen competition which had been met with, was, they added, very gratifying to them, as it would be to the shareholders. During the year ended Sept. 30, 6918 new services were installed, and more than 46 miles of street mains laid; this being the largest mileage of mains laid by the Company in any one year in its history. A considerable proportion of these pipes were of 24 and 36 inch sizes, required as additional trunk lines. When it was borne in mind that the quantity of gas put out during the past year was nearly double the quantity sold six years ago, the necessity for this large increase in the Company's system of trunk mains would be apparent. Further considerable increases had been made in the assessed value of the Company's property for municipal taxation, which necessarily increased the cost of production. A special meeting of the shareholders was held on March 3 for the purpose of passing certain bye-laws; and in accordance with these bye-laws application was made for Supplementary Letters Patent, which were granted on Aug. 28, enlarging and extending the powers of the Company. The Directors on Dec. 15 sold by public tender 3140 shares of the Company's capital stock, having a par value of $157,000.00; and the premium realized amounted to $97,262.50. In view of the unfavourable financial conditions prevailing during the later months of the year just closed, the Directors had not considered it desirable to make any further issue of capital stock, but made arrangements with the Company's bankers for the provision, on reasonable terms, of such funds as were required. The number of meters in use on Sept. 30 last was 99,648, as compared with 91,284 twelve months earlier—or an increase of 8364. The gas sales realized $2,453,417, against $2,294,308—which was an increase of $159,109.

The PRESIDENT, in moving the adoption of the report, said it was comforting to know that, in this time of stress, caused by the unparalleled war of nations, the Company had been able to present such a satisfactory statement to their shareholders. They had now about 1700 employees; and he was pleased to say that they had not had to dispense with the services of any, or to lower wages, on account of war conditions. Each year about $1,000,000 in wages and salaries was circulated in the city through their employees. The Company

were taking care of any dependants of those of the employees who had gone with the Canadian contingent, thus relieving the Patriotic Fund of a certain amount of calls upon it. Besides this they had established a rifle corps, who were drilling every week, in case they might be called upon later to do honourable duty. In order to alleviate some suffering during the coming winter, the Board had made arrangements whereby coke could be sold in small quantities at various coal-yards throughout the city. The Directors had decided upon a grant of $5000 to the Patriotic Fund and $500 to the Red Cross Fund; and this he was sure would meet with the approval of the shareholders. It would be noticed that the number of meters installed had just about touched the 100,000 mark; and, taking as an average five people to a family, it would seem that nearly all Toronto was using gas. In this respect, they compared favourably with any other gas company. The proprietors would join with him in voicing appreciation of the faithful services of all the officers and employees; for their co-operation was mainly responsible for the happy state of affairs existing.

The VICE-PRESIDENT (Mr. Wellington Francis, K.C.) seconded the resolution, which was carried unanimously.

HUDDERSFIELD GAS UNDERTAKING.

At the Council Meeting of the County Borough of Huddersfield, on Monday of last week, Alderman Joseph Blamires, J.P., was elected Mayor for the third year in succession.

The departmental reports submitted by the Mayor to the Council included the following by the Gas Engineer and Manager (Mr. Edward A. Harman, M.Inst.C.E.): The quantity of gas sold during the year ended March, 1914, amounted to 869 million cubic feet—a record output. The income for the year was £113,621, and the expenditure £99,142, leaving a gross or trading profit of £14,479, equal to nearly 4½ per cent. upon the capital outlay of £322,655. The profit was allocated as follows: Interest on loans, &c., £12,090; sinking fund, £1717; depreciation and contingencies fund, £672; total, £14,479. Since 1872 the Gas Department has contributed £171,266 to the relief of local taxation, which amount accumulated at interest would have more than paid off the original capital of the undertaking—a consideration which is often overlooked when making a comparison with gas undertakings which are prohibited by Act of Parliament from taking gas profits to the relief of rates. While no addition has been made to the capital account since the year 1897, the extensions now in progress at the works may render it desirable that the Committee should give this matter their consideration. The Gas Department is almost the largest ratepayer in the borough; the amount paid for borough, district, and poor rates for the year 1913 being £7023. The contingencies fund in hand now amounts to £38,689, which will be required to pay a portion of the cost of the new gasholder in course of erection; while the funds accumulated towards the redemption of the capital account amount to £122,425. The total number of gas consumers is 31,662, an increase on the year of 473. The penny-in-the-slot prepayment system continues its unbroken popularity; the amount of money collected last year being £31,625, being an increase of £2597 on the previous year. From the commencement of the system, in 1897, £298,562 has been collected.

LEEK GAS-WORKS EXTENSIONS.

Local Government Board Inquiry.

At the Leek Town Hall last Tuesday, Mr. M. K. North, M.Inst.C.E., held an inquiry into an application made to the Local Government Board by the Urban District Council for authority to borrow £1030 for the purchase of land and buildings, at present used as a foundry, for extending the gas-works. The Gas Engineer and Manager (Mr. R. H. Ginman) stated that he was appointed in May last, in succession to Mr. S. Trow Smith. He had carefully gone into the reports and evidence of his predecessor, and could corroborate the statements and figures put forward in the application to the Board. The proposed purchase of 2761 yards of land, now in the occupation of the Churnet Valley Engineering Company, was necessary to meet the immediate requirements and future demands on the gas undertaking. Mr. Ginman put in a table showing that in thirty years the make of gas has increased 231·187 per cent., or equal to 7·7 per cent. per annum. Taking the last fifteen years, which covered the introduction of electric light and the extensive adoption of incandescent gas lighting, and also the loss of gas consumption for power purposes for generating electricity at the Council's electricity station, there was an increase of 63·27 per cent., or 4·21 per cent. per annum. The future growth of the gas undertaking might confidently be taken as 4 per cent. per annum. The rate of increase in the output of gas so far as the present financial year was concerned was 6 per cent. over the corresponding period last year. The maximum output of gas in 24 hours occurred in December, 1913, amounting to 561,704 cubic feet. The maximum day's make in that month amounted to 563,000 cubic feet. The present gasholder capacity was 541,000 cubic feet. The working capacity was only 450,000 cubic feet. Calculating on a 4 per cent. increase for future growth, in the winter of 1917 the storage capacity would be reduced to 68·8 per cent. of the maximum day's output; and this was neither economical nor safe. The area of the present site of the gas-works was 2441 acres, and with the proposed addition of the adjoining Churnet Valley Engineering Company's site will bring the area up to 3017 acres. The Council had authority, under the provisions of the Leek Improvement Act, to purchase an area of not more than 4 acres for the purpose of their gas undertaking. An area of 3 acres of land was recognized as essential for gas-works for a town of the size of Leek, having regard to the provision of reasonable allowance for future growth. The Council had to make provision for additional storage in the immediate future; also for various shops, residual products works, and general storage. The land proposed to be acquired was particularly suitable for gas-works extensions; and he very strongly recommended its purchase.

LEEDS GAS-WORKS EXTENSIONS.

Loan Repayment.

At the Meeting of the Leeds Town Council on Monday last week, the Gas Committee recommended that a report by Mr. W. R. Herring relative to proposals for the reorganization of the Meadow Lane works contained in a report made by the General Manager (Mr. W. B. Leech) should be approved. They also recommended the adoption of a scheme for alterations and additions at the New Wortley works, referred to in the General Manager's report; and suggested that application should be made to the Local Government Board for sanction to borrow £13,617 to carry them out.

Mr. H. P. LAYCOCK contended that the money should be borrowed for a period of six years, because they were told they were going to save the money in this time. There was no city which had suffered more than Leeds from overborrowing and repaying over long periods; and no Committee in Leeds which had suffered more than had the Gas Committee. There was £1,250,000 outstanding on the undertaking, and practically nothing for it. They were told that they must make gas very cheaply and practically give it away; and the result would be that they would get such a large number of customers that the paying back of the money they were asked to spend on additions would be of no importance. He submitted (notwithstanding a protest from Alderman Wilson) figures in support of his argument that for the next twenty-five years the Corporation could not produce gas for less than 1s. 7d. per 1000 cubic feet. He considered they should not provide cheap gas for the next six years and make their grandchildren pay the bill. He moved, as an amendment, that the recommendations be referred back.

Alderman WILSON suggested that the proposed procedure had stood the test of generations. It was in no one's best interest to borrow for ridiculously short periods.

Mr. ARMITAGE advised the withdrawal of the recommendations so that the matter could be further discussed.

Alderman H. BROWN was averse to pushing forward a proposal to spend £130,000 or £140,000, or any portion of it, unless the Council were unanimous.

Mr. A. E. MASSER said he strongly objected to matters coming before the Council without the Chairman of the Committee explaining them in any way. If large schemes were introduced in this manner, not only the confidence of the Council but that of the public would be lost.

It was eventually agreed to withdraw the recommendations excepting so far as they referred to the application to borrow money. The amendment was also withdrawn.

ENGLAND AND THE ARTIFICIAL DYE INDUSTRY.

Lecture to the Society of Dyers and Colourists.

At a Meeting of the West Riding Section of the Society of Dyers and Colourists, held in the Bradford Technical College last Tuesday, Dr. F. M. PERKIN delivered a lecture on the "Artificial Colour Industry and its Position in this Country."

The lecturer began by discussing the reasons why the coal-tar industry had in a large measure passed to the Germans. Up to 1875, he said, the British industry was in a flourishing condition, and fairly held its own against foreign competition. Indeed, a very large number of important patents were taken out in this country. The neglect of scientific research during the next decade, however, was the reason why the trade, established as it was in this country, was gradually forced out by German competition. Research chemists could not be obtained. Our Universities did not train them. Germans could be had at moderate salaries; but German research chemists, after they had obtained a thorough knowledge of the processes, had a tendency to go back to their own country, where they were received with open arms, and were offered high salaries by the German companies. Popular taste changed; and the works which could turn out the largest number of new colours, and at the same time improve the methods of manufactnre and the quality of the older ones, would obtain the market. This was what the Germans had done. It was not correct to say, except to a limited extent, that they had stolen the artificial colour industry from us. There certainly had been a lot of piracy. In the early days of the industry German patent laws were, to say the least, chaotic; each State either having its own patent laws or its own ideas as to the administration of the patent laws. Therefore, for all practical purposes no patent law existed. It followed that the Germans had the brains of the world at their disposal, and had to pay no fees for the use of them. The moment a patent was published, it was seized upon by the German firms. It was a fact that the German colour works, when they were first founded, stole the work of English brains. The British Government protected German processes by allowing Germans to take out patents in this country which they were not required to work. On the other hand, German patents were refused to the British inventors. Our patent laws were against us, and the Germans made the most of the fact. The chief cause of our not being able to hold the artificial colour industry was the lack of industrial research. The Germans deserved their pre-eminent position in the industry, which was in the main due to pains-taking research, backed by thorough business organization. Another reason why the industry had been lost to this country was that, owing to Government restrictions, the use of alcohol on a large scale was for a long time prohibited; pure alcohol being necessary in the preparation and purification of some of the dyes. Though the Government had given some relief in this matter, the use of alcohol was still hedged and bound about with red-tape restrictions.

Turning his attention to the problem presented by the cutting-off of

supplies from Germany owing to the war, Dr. Perkin said: If the manufacture of aniline dyes on an adequate scale was founded in this country, it would be the bounden duty of the Government to see that it was not stifled again at the end of the war. Capitalists who might be willing to risk their money in putting up colour works asked what was to happen after the war. The Germans would again flood the market and undercut. In all probability they had accumulated large supplies, and would be willing to get rid of them at almost any price. Would the Government guarantee that for a certain number of years all dyeing which was done for Government departments should be dyed only with British-made dyes? If the Government agreed—and the manufacturers and users of this country should compel them to agree—what about other than Government users? Would they rush back to buy in the cheapest market? Because it went without saying that in most cases, for some time at least, the British dyes would not be so cheap as the German, owing to the enormous experience which the Germans had behind them.

On the other hand, in our gas-works we had a great deal of the raw products necessary. His own feeling was that a large portion of the raw products should be made by some of our large gas-works—that was to say, those which had tar-distilling plants. They had there in their works the benzol, toluol, naphthalene, anthracene, &c. Why should not nitrobenzol, aniline, and some of its derivatives, nitrotoluol, toluidine, the naphthols, naphthylamines, phthalic anhydride, and many other substances which were the raw materials for the colour works, be made at the source of supply of the raw products for their own manufacture? Many gallons of benzol were produced annually in Great Britain; and before the war two-thirds of this went to Germany, a portion of which they certainly used for making aniline. The question was one bristling with difficulties; but it was of instant urgency. His own feeling was that the firms now manufacturing should enlarge their output and obtain leave to work certain German patents; that many of the raw products should be manufactured at one or two of the great gas-works that might, after their plant was working, also make certain dyes and gradually branch out; also that a few new companies, with carefully-thought-out programmes, should be started.

With regard to consumers other than the Government, it would be very difficult to find them. The best solution of the problem would be to give them, or, rather, get them to take, an interest in the new works, or, for the matter of that, in the old ones. After war was declared, the Home Office revoked all German and Austrian patents during the continuation of the war. It was also stated that in certain cases licences would be granted to British manufacturers to take up and work these patents. He was informed recently by an eminent patent lawyer, and by one of the largest patent agents in London, that the granting of licences was practically a dead-letter. Further, that where licences had been granted, a royalty was reserved for the enemy; and there was no certainty that those who had obtained a licence during the war would be allowed to work the patent after the declaration of peace. If the trade was to come to this country, and to be retained, it was of vital importance that these matters should be cleared up; and the Government must help.

In proposing a vote of thanks to Dr. Perkin for his lecture, the Lord Mayor of Leeds (Mr. J. E. Bedford) remarked that they must recognize, even in the case of an enemy, the scientific and businesslike way in which they had conducted and developed an industry which had become of such importance. The Government had appointed a Board of Trade Committee, which included eminent scientific men, to consider the question; but so far as he knew no report had yet been made. People were, however, anxious to know how they stood; and the sooner the Government reported, the better it would be. Some people suggested that the Government should offer a form of protection. The great question, however, was that of finance; and perhaps the Government might be willing to grant a loan to instal machinery—the money to be repaid in a certain number of years.

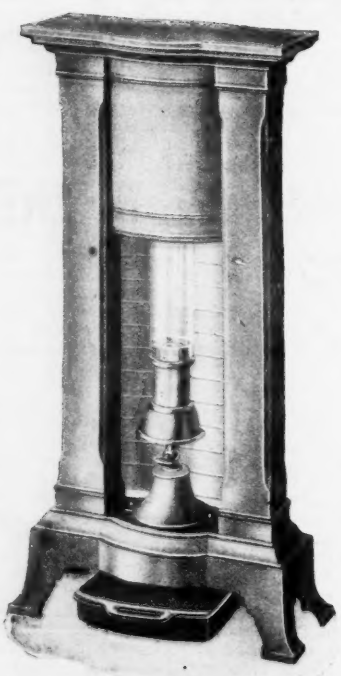
Professor W. M. Gardner (the Principal of the Bradford Technical College), in seconding, said that one reason why the trade had gone to Germany was that the investing public of England would never have stood the outlay of such a sum of money as was spent on the development of synthetic indigo before this product came into the market. One of the reasons why it would be peculiarly difficult to regain the industry was that in Germany many secondary and subsidiary interests had been built round about it. Before we could hope to successfully compete with Germany we should have to launch out, not only in the manufacture of colours, but in many other directions; and this would mean an enormous investment of capital.

Acknowledging the vote, Dr. Perkin admitted that the financial side of the question was a difficult one; but he thought if the matter was approached properly some of the very big gas companies might be able to find the money out of their own pockets, and make a start.

Chambers of Commerce and the Question.

Presiding at a special meeting of the Executive Council of the Association of Chambers of Commerce and Presidents of Chambers of Commerce, Sir Algernon F. Firth said the value of the aniline colours consumed in Great Britain was some £2,000,000 a year. Only about 15 per cent. of these dyes was produced in England, and a portion of the amount was dependent on intermediary products being acquired from Germany. Our production of cotton and woollen goods was £100,000,000; and this was dependent on aniline before it could be sold. To-day there was not more than six months' supply of aniline dye in the country. The question had been before the Government for ten weeks, but they had not yet made up their minds. "It is a question," said Sir Algernon, "of a key industry, upon which millions of our population depend, which key we have allowed to remain all these years in the hands of the Germans; and if we do not take it from them now we may never have another chance. It cannot be done by talking, and it will not be done by putting up a few thousand pounds and having one man doing this and another the other. They must not start with under £2,000,000 subscribed, guaranteed, or something of

Netley Hospital



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that sort. They must be prepared for the fact that whenever the war is over the Germans will be ready to make enormous sacrifices to close-down anybody who starts here. They will have to make up their minds one way or the other; but we must make sure that we are no longer in the hands of Germans for the supply of these dyes, which are absolutely essential for the continuation of these industries."

After discussion, a resolution was carried to the effect that the Association was much impressed with the urgency of the need for the establishment and effective development of the manufacture of aniline dyes in this country, and trusted that the Government would arrive at an early decision as to the action which they proposed to take to liberate British trade from the domination of Germany in the provision of these necessary supplies. It was also decided to ask the President of the Board of Trade to receive a deputation on the subject.

A State-Aided Dye-Stuffs Company.

The Board of Trade have been considering the question of the supply of dye-stuffs and colours. After consultation with the Committee on Chemical Manufactures appointed in August under the chairmanship of the Lord Chancellor, it appeared to the Board advisable to take steps to develop the immediately available sources of supply, and also to encourage the permanent manufacture of dye-stuffs and colours in the United Kingdom on a large scale, so as to guard against any recurrence of the present difficulty. Arrangements have been made to encourage the immediate expansion of the various existing sources of supply.

As regards the permanent supply, after preliminary consultations with representatives of some of the principal bodies of consumers, a meeting was held at the Board of Trade offices last Tuesday, and was attended by representatives of 22 important associations and firms engaged in the colour-using industries.

There was laid before the meeting a scheme for the formation of a limited company with a large capital, the bulk of which would be subscribed by the consumers of dye-stuffs and colours and others interested, while the Government would subscribe a proportion of the share capital, and guarantee the interest on a large debenture issue for a term of years. Precautions would be taken to preserve the British control of the enterprise, and prevent undue encroachment on other branches of the chemical trades.

The meeting was informed that preliminary arrangements had been made enabling the Government to acquire important dye-producing works in this country for the new company, if established, and that the Government would take all necessary steps to secure other concerns in the United Kingdom, the transfer of which to the new company might be desirable.

The meeting unanimously adopted a resolution approving, in principle, of a national effort being made by the trade to increase the British supply of synthetic colours, and welcoming the assistance of the Government for the purpose. A small Committee was appointed to confer with the Board of Trade in elaborating a scheme on the lines discussed.

THE SUGGESTED SINKING-FUND SUSPENSION.

In connection with the mayoral elections in Lancashire last week, several references were made to the suggested suspension of municipal sinking funds, as a means of affording relief to corporations in the present time of stress.

At Salford, the new Mayor (Alderman Worsley) said that, in the existing circumstances, it would be fair to ask the Government to allow them to suspend their payments into the sinking funds for twelve months, so that the period of each loan would be extended for a year —interest being paid, of course, for the full period. Such a scheme would be an enormous relief to the Corporation.

Mr. J. E. Willett was unanimously re-elected Chief Magistrate of Southport; and at the business proceedings which followed, Alderman O'Regan said that the suspension of the Corporation sinking fund would relieve the rates by about 1s. 9d. in the pound. He considered that it would be a boon to shopkeepers, who, in turn, would be able to retain the services of employees who would otherwise have to be discharged. Alderman Griffiths (the Chairman of the Tramways Committee) said he regarded the suggested suspension as a most dangerous proposition. If there was any relief to be given, he wanted it in a direct form, and not merely by suspending their liability for twelve months. The Town Clerk pointed out that the Accrington Corporation had convened a conference on this question, to which had been invited representatives of various municipalities; and the matter was allowed to stand over.

At the annual meeting of the Chorley Town Council, the Mayor (Alderman Hindle), who was re-elected for a second time, referred to the important extensions at the gas-works, and to the loan of £29,783 for which sanction was recently received from the Local Government Board. Some corporations were, he said, suggesting the suspension of sinking funds; but he should not advise this course, unless they were absolutely compelled to adopt it.

AIRDRIE GAS-WORKS VALUATION.

The question of the valuation of the gas-works of the Airdrie Corporation, which has to be fixed by the Corporation themselves sitting as a Valuation Court for the burgh, has once more passed the acute stage. At the sitting of the Court a few weeks ago, the new Burgh Assessor (Mr. S. H. Francis, of Glasgow), who is Surveyor of Taxes for the district, argued at some length in favour of the valuation of the gas undertakings being entered on the roll at £5234. Against this the Manager and Engineer (Mr. Dugald Currie) appealed on behalf of the Gas Committee, and asked that the figure should not be more than £4818, which was an average for the three preceding years; while the Parish Council of New Monkland, who have claimed a higher valua-

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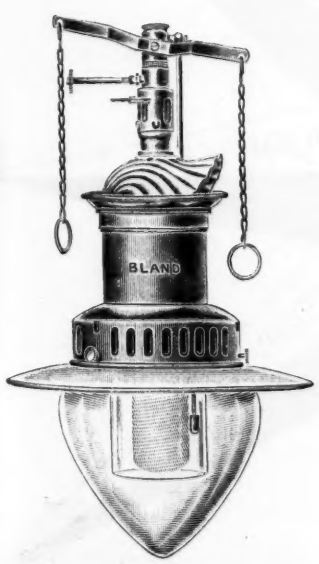

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tion for the past six years, again appealed in the interest of their rating of the burgh for parochial purposes, claiming that the valuation should be entered at not less than £6000. After three hours' discussion (the main point in dispute being the allowance to be made for "tenant's chattels"), in which various decisions of the High Courts were quoted, the Appeal Court, without giving any specific reason, fixed the valuation for the year at £5000. Mr. J. A. Reid, Law Agent for the Parish Council, asked that a case might be stated for appeal to the Court of Session. The Parish Council's main contention has been that the Corporation, in assessing their undertaking, did so in their own interest, and that the Council are entitled to a much higher assessable value for their rating. In the interval since the sitting of the Valuation Appeal Court, the Agent of the Parish Council was authorized to obtain an opinion of Counsel before proceeding with the appeal to Edinburgh by a stated case. Meanwhile a case was prepared by the Town Clerk, and it seemed that Mr. Reid took the opinion of Sheriff Wilson, K.C., on the question of whether his clients would be justified in appealing to the Court of Session. Counsel's opinion was intimated to the Parish Council at their last meeting, and, in the main, was adverse to an appeal. The result was that they decided to drop the appeal for this year also. The Clerk called the attention of the Parish Council to the fact that the Town Council had now given notice of their intention in future to place the valuation of the gas-works in the hands of Mr. Jackson, the Assessor of Railways and Canals. The Corporation, it may be stated, have taken this course, as provided for by the Act of Parliament, in order to avoid continual friction on the subject with the Parish Council.

WINDSOR WATER-WORKS MANAGEMENT.

The Appointment of a Consulting Engineer.

Nearly four columns of the "Windsor, Eton, and Slough Express" were recently occupied by the report of a meeting of ratepayers at Windsor to protest against the decision of the Town Council to grant Mr. C. Sainty, formerly Manager of the Water-Works, a fee of £50 a year as Consulting Engineer. The matter was also referred to in an editorial note, in the following terms.

"The Council, it will be remembered, discussed the matter in committee, and the proposition was carried by twelve votes to eight, one or two members not voting. When Mr. Sainty retired from the water-works, the Council granted him £100 a year for three years. It was pointed out then that they could not pension him, as it would be illegal; and then it was decided to appoint him Consulting Engineer. At Monday's meeting, a proposition was carried, without a single dissentient vote, to the effect that the Town Council had, by its decision to pay an ex-official, evaded the law; and the meeting strongly objected to any payment of a pension under another name. Some very strongly-worded speeches were made. Councillor J. P. Hollis, who supported the payment at the Council meeting, was the only one present on Monday who really spoke in favour of the Council's decision; he contending that old servants were deserving of consideration at the hands of their employers, and that if Mr. Sainty had been employed in a large town he would have been adequately pensioned. To our mind, the whole question turns upon the point of legality. If it is illegal to pension a Corporation employee—no matter in what capacity he serves—and if Mr. Sainty has been given a position that is not required in order that the law may be evaded, then we think that the Town Council's decision will not hold water, and will be quashed. If, on the other hand, the Town Council is within the law, it may well do both kindly and wisely in creating such an office to help an old servant in his declining years; and we think many ratepayers would support this view. We would welcome a decision which may help anyone (no matter what his position) who has grown grey in the town's or other service, to receive a pension to help him to live in comfort during his old age."

The matter was discussed at some length at the meeting of the Town Council last Wednesday, with the result that a motion by Mr. Stoneham, to the effect that the Council objected to "the payment of an ex-official being called a consulting engineer," was lost by 14 votes to 8.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Nov.* 16.

In the London market for tar products there is no change in prices.

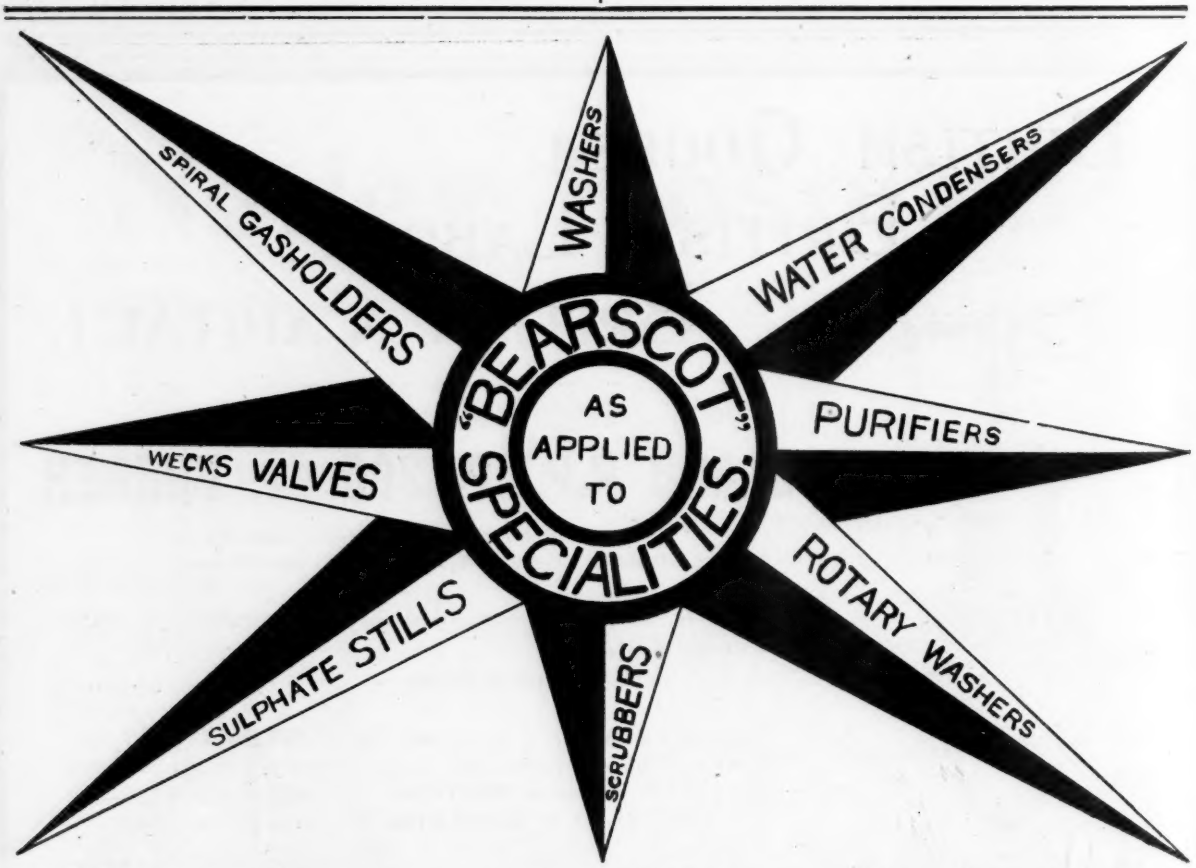
Sulphate of ammonia is also quiet, and quotations are unaltered since last week.

Tar Products in the Provinces.

Nov. 16.

Markets for tar products remain fairly steady, and on the whol prices are well maintained. Benzol is quiet; but there is a better de mand for toluol and crude carbolic. There is little business doing in solvent naphtha. In heavy naphtha, the prices remain fairly steady. Creosote is firm, and fair prices are being paid.

The average values during the week were: Value of liquid products in one ton of tar, 16s. 6d. to 18s. Benzol, 90 per cent., naked, North, 8½d. to 9d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. to 2s. 3d. Crude naphtha, in bulk, North, 5½d. to 5¾d. Solvent naphtha, naked, North, 8½d. to 9d. Heavy naphtha, naked, North, 11d. to 1s. Creosote, in bulk, North, 3⅜d. to 3 7/16d. Heavy oils, in bulk, 4d. to 4½d. Carbolic acid, casks included, 60 per cent., East and West Coasts, 2s. 6d. Naphthalene, £4 10s. to £10; salts, 60s. to 65s., bags included. Anthracene, "A" quality, 1¾d. to 2d.; "B" nominally ¾d.



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Sulphate of Ammonia.

LIVERPOOL, *Nov.* 14.

There is no new feature to comment upon in the market for this article, the tone having continued dull and values having remained unchanged from the beginning to the end of the week. The United States are still disinclined to import on an extensive scale, and no other large demand has come forward to take the place of American orders. The closing quotations are still £10 15s. per ton f.o.b. Hull, £10 16s. 3d. f.o.b. Liverpool, and £10 17s. 6d. f.o.b. Leith.

Little fresh business has transpired for future delivery, but it is reported that £11 2s. 6d. f.o.b. good port has again been paid to producers for January-June shipment.

Nitrate of Soda.

The market for this material is again easier and the values are now 9s. 6d. per cwt. for ordinary and 10s. 1½d. for refined quality, on spot.

Sulphate of Ammonia.

From another source it is reported that the market for this article has been very quiet during the past week, and slightly lower prices have been accepted at several ports. Outside London, makes to-day are quoted at £10; Hull, £10 12s. 6d. to £10 15s.; Liverpool, £10 15s. to £10 16s 3d.; Leith, £10 16s. 3d. to £10 17s. 6d.; Middlesbrough, £10 15s. to £10 16s. 3d.

Galician Oilfields.—The following appeared in the "Financial News" last Friday: "The Editor of the 'Petroleum Review' informs us that as soon as it was known that the Russian armies had occupied positions in Austria in comparatively close proximity to the oilfields, Dr. Paul Dvorkovitz, the well-known petroleum expert, proceeded to the Galician fields, travelling *viâ* Raumo and Petrograd. As a result of his influence with the military authorities, he has been allowed to spend a fortnight in Galicia, during which time he rendered great service to several of the English companies out there, and arranged, in some cases, food supplies and Government protection."

The Water Shortage in the Consett District.—It was reported to the Consett Urban District Council last week that the Weardale and Consett Water Company were pushing forward arrangements to meet the shortage of water, and also to obtain a supply for the Chester-le-Street area, which would relieve the pressure. It was also announced that the Company contemplated supplying the Consett district once more with a full service as from the following day (Thursday); but they did not give any guarantee that the supply would be maintained. Several members thought the Council should consider most carefully the preamble of the Bill the Company proposed to submit to Parliament for power to construct a new reservoir; and a deputation was appointed to confer with the representatives of the Company on the matter.

COAL TRADE REPORT.

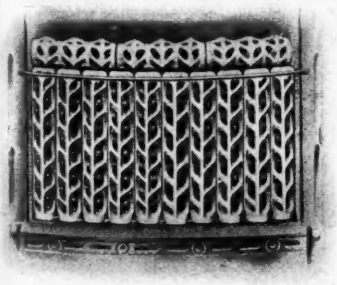
Northern Coal Trade.

The coal trade is firm for home use; but the export trade is very uncertain and quiet. Coal itself is, for some classes, a little easier in price, but freights are high, though the high rates attract tonnage. Gas coal to London averaged 3s. 5d. per ton freight for last year; but the current rate is now about 4s. 9d. per ton. To Genoa last year, 9s. 3d. was the average; now 17s. has been paid—advances that seriously influence the cost of the coal delivered. In steam coals, best Northumbrians are 13s. per ton f.o.b.; second-class steams are 10s. 9d. per ton; and steam smalls are comparatively steady at 7s. 9d. to 9s. 3d. per ton f.o.b., according to class. The gas coal trade is steady, especially for the higher qualities. Best Durhams are in fair demand at 12s. 6d. per ton f.o.b.; second-class gas coals are quiet at 10s. 9d. per ton; and "Wear Specials" are unaltered at 13s. per ton f.o.b. Deliveries of gas coal are fairly full on the long contracts; but there is little doing in the way of the sales of cargoes, because of the high freights—new business being generally of a "hand-to-mouth" character. Work at the collieries is still short time; but the large number of enlistments of miners will soon alter the position. Coke is steady, with heavier shipments. Gas coke is in larger output, and is quoted from 11s. 9d. to 12s. 6d. per ton f.o.b. in the Tyne.

Public Lighting Charge at Leiston.—With regard to the interrupted public lighting, the Leiston Gas Company lately addressed a letter to the Urban District Council, stating that they were willing to make the Council some allowance in respect of the public lamps which had not been lighted owing to police orders. They also suggested that Mr. Henry Woodall, of Messrs. Corbet Woodall and Son, be asked to arbitrate. It has been resolved that the Council learn the opinion of Mr. Woodall, without binding themselves to abide by it, and then the whole question will be left to the Lighting Committee.

Wantage Gas Supply.—At the last meeting of the Wantage Urban District Council, Mr. A. J. Belcher, in moving the adoption of the report of the Gas Committee, presented the annual balance-sheet. He said the profit for the year covered by the return was not so favourable as that for the previous twelve months, owing to the reduction in the price of gas. The profit and loss account showed a decrease of £25 in bad debts; and there were creditors to the extent of £368, as compared with £420 last year. Out of the year's profit, £50 had been allocated to the relief of the rates. During the period under review a new coal-shed had been erected and a new bed of retorts installed. The Committee considered this to be a satisfactory state of affairs; but they did not recommend a further reduction in the price of gas, for the reason that in the near future the question of additional gas storage would have to be considered. The output, however, was steadily increasing. After a short discussion, the report and balance-sheet were accepted.

The "THERMO-X" Firefront.



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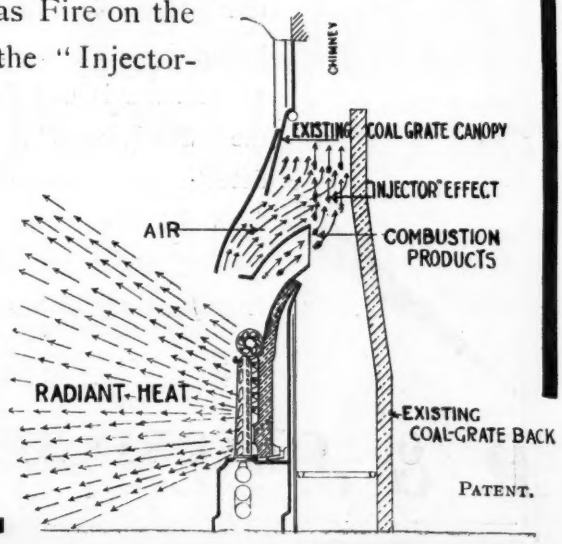
No one would use a Gas Fire to-day unless it had a firefront on the "THERMO-X" principle.

To get the same comfort with a Gas Fire as with a Coal Fire it is indispensable to have a Gas Fire on the "Thermo-X" principle, and embodying the "Injector-Ventilating" principle.

The vital importance of the Ventilation question to Gas-fire progress cannot be exaggerated. This "Injector-Ventilating" Invention is going to drive it home to all concerned.



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Damaged Gas-Fittings Result in a Death.

As the result of a gas explosion in a house in Upton Street, Belfast, Edith Bruce (aged 22) met her death, and another girl, named Madge Briggs, received injuries. The explosion occurred in a front parlour, when, on a strong smell of gas being discovered, a lighted candle was brought in. At the inquest on Miss Bruce's body, Constable Fox said the girls were on the stairs in flames when he entered to effect a rescue. The gas-pipe in the parlour was cut or broken, and bore traces of the use of a knife; and the meter, which ought to have been in the room, was lying in a battered condition in the scullery. The place was full of gas. The meter could not have been blown into the scullery by the force of the explosion. Frederick Craig (Corporation Gas Inspector) said that money had been taken from the meter and the lock had been wrenched off. Other evidence showed that deceased carried the light into the parlour; and it was proved that, with the exception of the meter, all the Corporation fittings were in good order. The verdict stated that death was caused by burns, and that the explosion arose from the deliberate severance of the service-pipe. In the Belfast Police Court, Edward M'Grath was charged with stealing 9d. from the meter in the house in Upton Street, and with maliciously damaging the meter, and was remanded. Accused denied both charges. District Inspector Ross said it was possible a more serious charge would be preferred.

Ilkeston Gas Revenue.—Councillor J. A. Macdonald, who is the Chairman of the Ilkeston Gas Committee, has been re-elected to the office of Mayor, and in returning thanks for his re-appointment indicated the probability of a decreased revenue from the municipal trading concern. The truth of the matter is that the Ilkeston tramways are a failure financially; and the only hope of rehabilitation of the municipal exchequer lies in what can be squeezed out of the gas consumers.

The Gas Workers' Union.—Mr. J. R. Clynes, M.P., the General District Secretary of the National Union of Gas Workers and General Labourers, in his report for the quarter ended September, claims the following among other concessions secured during the period covered: Sunderland Gas Company, three days' holiday per annum, with pay, for the gas-fitters. Wath gas-workers, establishment of the eight-hour day, and extra time for week-ends. Wombwell gas-workers, extra time for week-ends.

Ince Council and the Wigan Gas Supply.—At the last meeting of the Ince District Council, a letter was read from the Town Clerk of Wigan replying to the Council's complaint as to the alleged unsatisfactory quality of gas supplied to the township, in which it was stated that individual complaints would be dealt with immediately. The Clerk was directed to communicate further with the Wigan authorities, and to point out that, apart from individual cases (in which the Council recognized the Corporation's efforts to remedy complaints), the general lighting was unsatisfactory—due, in the Council's opinion, to an inadequate main service.

Gas Supply Going Ahead in Birmingham.

Restricted street lighting in the centre of Birmingham, and the dislocation of business in many directions caused by the war, notwithstanding, the output of the Gas Department is now pursuing its usual upward course; for it is stated that there is more gas being burnt now than there was at the same period last year. In fact, during the last three weeks the consumption of gas has exceeded by 16 million cubic feet that during the like period of 1913. To some extent this is accounted for by the increased number of gas-cookers and gas-fires in service; but it also affords evidence that generally trade is fairly good, and that in not a few instances factories are working long hours at night. Following the August Bank Holiday, there was a marked decrease in consumption; the demand dropping down to about 7 million cubic feet a week below that of the same period of last year. Subsequently, the consumption began to increase, and by the end of the month the supply had returned to the level of the previous year. Then there was some fluctuation, followed by a steady rise. The turning-down of the lights in the tramcars makes no great difference to the supply of electricity; but the modification in the tram services throughout the city, owing to the scarcity of motor men and conductors, has affected it. With this exception, it is reported that the demand for electrical power, though it decreased in the early days of the war, has picked up, until it is now about normal.

Fatality at Smethwick Gas-Works.—The Birmingham Coroner (Mr. Isaac Bradley) last Wednesday conducted an inquiry concerning the death of Jesse Wilks Hancox, aged 54, a gas stoker in the employ of the Smethwick Corporation. The evidence showed that the deceased, who had been employed at the gas-works for about 25 years, was engaged on the previous Friday afternoon in clearing the ashes from beneath a furnace. After throwing a bucket of water to cool the ashes remaining in the hole, he stepped back to avoid the steam, and in doing so fell into the hopper, and was burned all over the body. He died at the General Hospital on the following Sunday from shock. A verdict of "Accidental death" was returned.

Increased Price of Gas at Shrewsbury.—At the annual meeting of the Shrewsbury Town Council on Monday last week, the Lighting Committee reported that notice had been received from the Gas Company of an increase in the price of gas, and in the prices charged for street-lamps, &c., from the 30th of September last. The Committee said they had intimated to the Company that, in their opinion, they had raised the price of gas unnecessarily quickly, and before the effect of the war on their business could be fully gauged. Alderman Deakin said he did not consider that, with their substantial resources, there was any necessity for the Company to rush into a rise in the price of gas so soon. The question would be further considered from a very important standpoint—viz., whether the Company were justified in what they were doing; and the Committee were determined to make investigations, and ascertain whether or not this was so.

The "Lancet"

AND

The Davis Gas Stove Company.

"But we do not forget, and have pointed out before, that, much to their credit, the movement (for Hygienic Efficiency in Gas Fires) was begun by a firm of Gas Fire Makers—namely, Messrs. Davis and Co., of Luton, who introduced the Shadowgraph, an apparatus designed for detecting the escape into the room of water vapour from the fire. This invention has done excellent service, and it inspired the introduction of another test which was devised in the 'Lancet' Laboratory."

—The **"Lancet,"** *17th Oct., 1914 (p. 958).*

60, OXFORD STREET, LONDON, W.

Rhyl Urban District Council Gas Supply.

The Gas Engineer and Manager of the Rhyl Urban District Council (Mr. Leonard G. Hall, Assoc.M.Inst.C.E.) has issued his working statement for the year ended the 31st of March. It shows that the quantity of gas made was 67,239,000 cubic feet, of which 62,211,400 cubic feet, or 92·52 per cent., were sold. The gas unaccounted for was 5·85 per cent. There were 5405 tons of coal carbonized, and the make of gas per ton was at the rate of 12,440 cubic feet, of which 11,510 cubic feet were sold. The residuals produced were: Coke, 3378 tons; tar, 54,000 gallons; ammoniacal liquor, 163,020 gallons—being respectively 8¾ cwt., 10 gallons, and 30·1 gallons per ton of coal carbonized. The cost of manufacture per 1000 cubic feet of gas sold was 22·88d.; of distribution, 2·75d.; of management, 1·66d.; and the total expenses, less residuals, came to 20·36d. The revenue from gas being 44·05d., the net profit on revenue account was 23·69d. When worked out on the basis of the tonnage of coal carbonized, the figures are: Manufacture, 21s. 11·38d.; distribution, 2s. 7·62d.; management, 1s. 7·17d.; total expenditure, less residuals, 19s. 6·28d.; revenue from gas, 42s. 3d.; net profit on revenue account, 22s. 8·72d. The net profit on revenue account was £6140; but interest on loans amounted to £1004, and the sum set aside for the redemption of loans to £1906—together, £2910—bringing the net profit down to £3230.

Gas-Works Extensions at Aberavon.—Last Thursday, Mr. H. R. Hooper, M.Inst.C.E., one of the Inspectors of the Local Government Board, conducted an inquiry at Aberavon into an application by the Corporation for a Provisional Order, under the Public Health Act, to partially repeal, alter, or amend the Aberavon Local Board Act of 1866, and other Acts, so as to enable the Corporation to borrow such additional moneys (not exceeding £23,500) for the purposes of their gas undertaking as the Board might sanction. Mr. Ernest Tennant, the Deputy Town Clerk, Mr. A. J. Bond, the Gas Manager, and the Accountant (Mr. F. E. Baker) submitted details; and there was no opposition to the proposal.

Proper Shading of Lamps.—The following remarks on this subject appeared in the "Ironmonger" last Saturday: "The regulations regarding the lighting of London and the Metropolitan area have been received on the whole without grumbling, and acted upon carefully by shopkeepers and others. At the same time, the methods of screening the light in many cases leave something to be desired from a safety point of view. It is unsatisfactory, for example, to surround electric lamps with coloured paper or other material, the use of which is certainly fraught with danger. Elsewhere the globes of outside lamps or high-pressure inside lamps have been pasted over with these coloured papers, which are likely to have a damaging effect on the globe itself. The proper course is to dip the lamps, or surround them with a metal shade."

Temporary Failure of Gas at Rochdale.

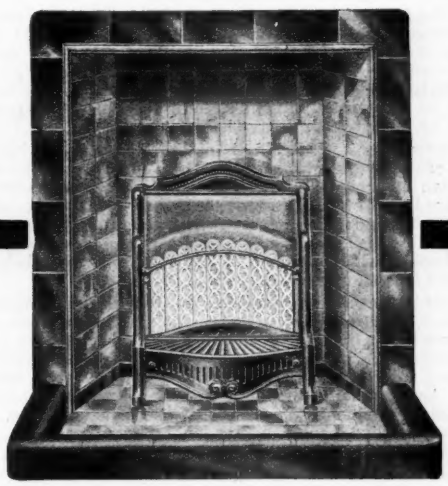
About seven o'clock last Thursday evening Rochdale was plunged into semi-darkness owing to a temporary stoppage in the supply of gas. According to the account of the occurrence given by the "Rochdale Observer," the trouble arose through a leaky valve, which allowed water, the result of a downpour of rain, to get into the outlet-pipe of one of the gasholders, which had been in use since four o'clock in the afternoon without any defect being discovered. The Assistant-Manager (Mr. James Mellor) was at the time in the office on the works, and he at once took steps to bring another holder into use. There was necessarily some alarm on the part of the townspeople; and all sorts of sinister rumours were soon afloat. Fortunately, however, the gas was not off more than a few minutes; and in shops and houses brightness soon reigned once more. But the streets remained dark and dismal for an hour or two longer, though efforts were promptly made to again light the extinguished street-lamps. No mishap appears to have resulted from the accident. The Corporation Gas Engineer (Mr. T. Banbury Ball) was at home when the trouble occurred. He noticed the gaslight in his dining-room gradually failing, and, at once realizing that something was wrong, made his way to the works. Happily Mr. Mellor had taken action; and Mr. Ball and he then proceeded to ensure that no further interruption of the gas supply should take place.

Ossett's Obligations.—Thanks to the retiring Mayor (Mr. Robinson) formed a feature at Ossett of the welcoming-in of the new Mayor (Mr. Samuel Barton Stead). Special allusion was made by Alderman Marsland to the promotion of the Corporation Bill and the extension of the gas-works, which, he said, "had largely been in the hands of the retiring Mayor, for whose foresight and unsparing devotion to his public duties the townspeople owed a great debt of gratitude."

Decreased Gas Consumptions in Cotton Towns.—The monthly gas-works returns of Lancashire undertakings in the cotton towns show decreased consumptions of gas in many cases. This is due entirely to mills being stopped or working short-time on account of the war. At the last meeting of the Heywood Gas Committee, Mr. W. Whatmough (the Engineer and Manager) reported that the September output was 270,000 cubic feet less, as compared with the corresponding month of last year.

Warwick Gas Company in Parliament next Session.—At the meeting of the Warwick Town Council yesterday (Monday) week, it was reported by the General Purposes Committee that the Warwick Gas Company had submitted the draft of a proposed Bill relating to the Company to supersede the Act under which they were originally incorporated in the year 1822, and dealing principally with the capital and the shareholders of the Company, and giving power to extend their mains beyond the borough. A Sub-Committee has been appointed to consider the matter.

INTERIOR DECORATION.



During recent years vast improvements have been made with regard to interior decoration and furnishing, and it has therefore been necessary to design fires to harmonize with such decorations.

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BIRMINGHAM AND LONDON.

WITHDRAWAL OF ENEMY PATENT APPLICATIONS.

10,356 of 1903.—Grantee: Hills and Lane, "Hydrogen gas." Applicants; R. & J. Dempster, Limited.

17,591 of 1909.—Grantee: Lane, "Hydrogen gas producing apparatus." Applicants; R. & J. Dempster, Limited.

APPLICATIONS FOR LETTERS PATENT.

21,868.—Wade, H. C., "Gas-generating apparatus." Nov. 2.
21,927.—Pearson, R., and Scott, C. J. F., "Mantles." Nov. 3.
21,946.—Gascoyne, A. M., "Gas-cooker rack." Nov. 3.
22,021.—Canova, V., "Automatic gas-lighter." Nov. 4.
22,066.—Aldridge, J. G. W., "Charging and discharging retorts." Nov. 5.
22,096.—Turner, W., "Cocks and valves." Nov. 6.
22,125.—Armstead, S. F., "Manufacture of gas." Nov. 6.
22,144.—Hendler, M., Lamp-lighting device." Nov. 6.

Nelson Water Supply.—Mr. W. Fell, J.P., the newly-elected Mayor of Nelson, after dealing with the work of the various committees, referred to the completion of the Ogden No. 3 reservoir, stating that the work of construction had occupied a much longer time than was anticipated, and it was not until December of last year that they discovered the real cause of the delay. They were compelled to go to arbitration, with the result that the reservoir had cost £320 per million gallons. There was still an abundance of water in the Barley district; but having regard to the rapid increase of consumption, it behoved the Water Committee to consider the advisability of preparing a new scheme.

New Issues of Gas and Water Capital.—At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards offered for sale, by order of Directors, two new issues of capital. The first consisted of £10 preference shares (6 per cent.) in the Bournemouth Gas and Water Company; and they were all placed at from £12 15s. to £13 1s. 3d. each. The other issue was £10 "B" shares and 4 per cent. perpetual debenture stock of the Grays and Tilbury Gas Company. The shares, which rank for a standard dividend of 7 per cent. equally with the existing "B" shares, on which £5 19s. per cent. per annum has been paid for some time, fetched from £10 15s. to £10 17s. 6d. apiece *cum div.* as from the 1st prox.; and the stock was sold at £85 per £100.

Tenders have been received by the Bristol Water Company for £100,000 of 4½ per cent. perpetual preference stock. The offers exceeded £248,000, at prices ranging from 110 per cent. to par.

At an auction sale, held last Thursday, of 80 ordinary 7 per cent. shares in the Bideford Gas and Coke Company, Limited, the prices averaged £19 1s. per share. The dividend now being paid on these "sliding-scale" shares is 10½ per cent.

The Leek Urban District Council have decided, on the recommendation of the Gas Engineer and Manager (Mr. R. H. Ginman), to accept the tender of Messrs. Geo. Waller and Sons for coke breaking and screening plant at the gas-works. At the meeting of the Council at which this decision was come to, Mr. Ginman was congratulated upon an increase of 410 cubic feet in the make of gas per ton of coal since his appointment in May last.

Messrs. J. & W. B. Smith, of Farringdon Road, have sent us a copy of their newest pocket edition booklet on "Up-to-Date Lighting," in a patriotic cover, showing a variety of gas lights for outdoor use, and also for lighting shops, factories, and large areas. The latest patterns in "Silva" and other well-known gas-lamps, advertising lamps and screens, inverted globes, &c.—all British made throughout—are shown. The booklet will be supplied to gas companies with their name substituted for that of the firm.

We have received from the British Aluminium Company, Limited, of No. 109, Queen Victoria Street, E.C., a pamphlet furnishing much information in regard to electric power transmission by means of aluminium conductors. It is a revised edition of a previous pamphlet, the original matter in which has been amplified and brought up to date. Among other new features are a table of safe currents for overhead aluminium conductors on a basis of rise in temperature, and matter dealing with line regulation, erection, scrap value, &c.

The crusade which is now being carried on against German or Austrian made articles has called forth a publication which has for its object the bringing together of the manufacturer and the buyer, the inventor and the capitalist, all the world over. Its title is "Made in England and Britain Abroad," incorporating Scotland and Ireland. The number to hand is the first circulated issue, and its contents consist of a series of articles with a "Buyers' Guide" occupying the centre of most of the pages, which are large. Under the heading of "Incandescent Gas-Mantles," the information is furnished that, according to rumour, "a large deposit of [monazite] sand has been located not very far from Brazil, and that it has been acquired by one of the biggest London corporations very closely connected with the manufacture of gas." The new periodical is published monthly.

Messrs. E. A. Reed and Co, Limited, of No. 14, Victoria Street, S.W., forward a new edition of their catalogue, which contains a series of photographs and particulars of labour-saving appliances for the transportation of materials, the whole of which have been recently manufactured and erected by them. There are elevators and conveyors of many different kinds suitable for gas and other works. In fact, no matter what the material may be which it is required to transport, the firm seem to have a special pattern of conveyor designed to do it. Then there are screening plants and coke-breakers, coke-barrows, and tar and liquor pumps. A section of the list is devoted to steel buildings and reinforced concrete construction; and one of the photographs included is of a steel purifier-house. The firm are, it may be mentioned, the London Agents for Messrs. W. C. Holmes and Co., of Huddersfield, reference to whose specialities is made in the catalogue.

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GAS COMPANIES IN THE STOCK EXCHANGE.

During the past week the interest of Capel Court has been centred in, if not wholly engrossed by, the new arrangements promulgated by the Stock Exchange Committee, to which reference was made in last week's issue; and something like a battle royal has raged over this ill-starred edict. The soundness of many of the criticisms levelled at it was recognized and admitted, and the Committee have had a busy time in drafting amendments. These are generally welcomed, although, of course, they fall short of satisfying everybody. Some would have had an indefinite postponement; and no doubt they will claim to have been in the right unless the scheme in its operation works out with perfect smoothness, which is almost more than can be expected. In the meantime, business in the Market has been at its lowest ebb—a period of suspension—but the general feeling seemed to be fairly cheerful. As regards gas undertakings, Messrs. A. & W. Richards, at the Mart last Tuesday, disposed of Bournemouth Gas and Water Company 6 per cent. preference at an average price returning 4¾ per cent. for money; Grays and Tilbury ordinary to return 5½ per cent.; and ditto debenture to return rather under 4¾ per cent.

The great event of the current week will be the creation of the War Loan of 200 millions or upwards, which is expected to be subscribed for with alacrity.

The Money Market continues extremely easy.

OFFICIAL QUOTATIONS AT THE CLOSE OF THE STOCK EXCHANGE ON JULY 30.

Issue.	Share.	When ex-Dividend.	Dividend or Interest and Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59–64	..	3 18 2
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76–79	..	5 1 3
280,000	5	April 29	7½	Bombay, Ltd.	5⅞–6⅞	..	5 17 8
50,000	10	Feb. 26	16	Bourne- 10 p.c.	29–30	..	5 6 8
373,480	10	,,	7	mouth Gas B 7 p.c.	15–15½	..	4 10 4
95,000	10	,,	6	and Water Pref. 6 p.c.	13¾–14	..	4 5 9
380,000	Stk.	Feb. 26	14	Brentford Consolidated	261–266	..	5 5 3
330,000	,,	,,	11	Do. New	204–209	..	5 5 3
50,000	,,	,,	5	Do. 5 p.c. Pref.	109–111	..	4 10 1
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91–93	..	4 6 0
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208–213	..	5 3 4
244,200	,,	,,	8	Do. A Ord. Stk.	154–159	..	5 0 8
530,000	20	Mar. 26	12½	British	44–45	..	5 11 1
120,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88–90	..	4 8 11
245,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85–87	..	4 12 0
100,000	10	—	—	Cape Town & Dis., Ltd.	1½–2½	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	4–6	..	—
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70–75	..	6 0 0
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	108–110	..	4 10 11
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106–108	..	5 1 2
560,000	,,	,,	5½	Do. 3½ p.c. do.	103–105	..	5 1 6
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½–71½	..	4 3 11
800 000	Stk.	,,	4	Continental Union, Ltd.	76–79	..	5 1 3
200 000	,,	,,	7	Do. 7 p.c. Pref.	115–118	..	5 18 8
492,270	Stk.	—	6	Derby Con. Stk.	123–125	..	4 16 0
55,000	,,	—	4	Do. Deb. Stk.	102–104	..	3 16 11
1,002,180	10	July 29	10	European, Ltd.	17⅛–18*	..	5 11 1
16,362,910	Stk.	Feb. 12	4/17/4	Gas 4 p.c. Ord.	98–102	..	4 15 6
2,600,000	,,	,,	3½	Light 3½ p.c. max.	76–79	..	4 8 7
4,062,235	,,	,,	4	and 4 p.c. Con. Pref.	96–99	..	4 0 10
4,674,850	,,	June 11	3	Coke 3 p.c. Con. Deb.	72½–74½	..	4 0 6
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87–89	..	5 12 4
70,000	10	April 29	11	Hongkong & China, Ltd.	16½–16⅝	..	6 11 4
131,000	Stk.	Mar. 12	7⅛†	Ilford A and C	151–154	..	5 2 4
65,780	,,	,,	6⅛†	Do. B	115–118	..	5 8 0
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92–94	..	4 5 1
4,940,000	Stk.	May 14	9	Imperial Continental	150–160	..	5 12 6
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84–86	..	4 1 5
200,242	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119–121	..	5 7 6
561,000	Stk.	Feb. 26	10	Liverpool United A	211–213	..	4 13 11
718,100	,,	,,	7	Do. B	146–148	..	4 14 7
306,083	,,	June 26	4	Do. Deb. Stk.	97–99	..	4 0 10

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
75,000	5	June 11	6	Malta & Mediterranean	4¼–4⅝	..	6 9 9
250,000	100	April 1	4½	Met. of Melbourne 4½ p.c. Deb.	99–101	..	4 9 1
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	98½–99½	..	4 10 6
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82–83	..	4 4 10
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14–15	..	5 2 8
300,000	Stk.	May 14	8	Oriental, Ltd.	117–122	..	6 11 2
60,000	5	Mar. 26	10	Ottoman, Ltd.	7⅛–7⅜	..	6 9 0
60,000	50	Feb. 26	13	Portsea, Island B	128–131	..	4 19 3
100,000	50	..	12	Do. C	118–121	..	4 19 2
249,980	5	April 29	8	Primitiva Ord.	5½–6	..	6 13 4
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅝–5	..	5 0 0
521,600	100	June 2	4	,, 4 p.c. Deb.	91–93	..	4 6 0
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85–87	..	4 12 0
150,000	10	May 14	6	San Paulo 6 p.c. Pref.	10½–11	..	5 9 1
125,000	50	July 1	5	5 p.c. Deb.	47–49	..	5 2 9
135,000	Stk.	Mar. 12	10	Sheffield A	223–224	..	4 9 3
209,984	,,	,,	10	Do. B	222–224	..	4 9 3
523,500	,,	,,	10	Do. C	220–222	..	4 10 1
90,000	10	May 28	9	South African	10½–11½	..	7 16 6
6,429,895	Stk.	Feb. 12	5/9/4	South Met., 4 p.c. Ord.	111–113	..	4 16 8
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½–74½	..	4 0 6
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157–159	..	5 6 11
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114–116	..	5 3 5
60,000	,,	,,	5	Do. 5 p.c. Pref.	110–112	..	4 9 3
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116–118	..	4 4 9
629,740	Stk.	May 14	5	Southampton Ord.	99–102	..	4 18 0
120,000	Stk.	Feb. 12	7½†	Tottenham A 5 p.c.	135–138	..	5 8 8
742,275	,,	,,	6†	District B 3½ p.c.	115–117	..	5 2 7
181,255	,,	June 26	4	4 p.c. Deb.	87–89	..	4 9 11
182,380	10	Dec. 30	5	Tuscan, Ltd.	5–6	..	8 6 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93–95	..	5 5 3
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½–109½	..	4 11 4
				Wandsworth, Wimbledon, and Epsom—			
90,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151–156	..	5 7 4
255,636	,,	,,	6⅞	,, B 3½ p.c.	129–134	..	5 2 7
108,075	,,	,,	5/17/3	,, C 3½ p.c.	110–115	..	5 2 0
352,000	,,	,,	6½	Wimbledon 5 p.c.	117–122	..	5 0 5
98,000	,,	,,	6⅝	Epsom 5 p.c.	121–126	..	5 5 2
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66–69	..	4 6 11

Prices marked * are "Ex Div." † Next Dividend will be at this rate.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

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Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

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Makers of all Sorts and Sizes.

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, Oct. 20, p. 158.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
Joseph Taylor and Co., Central Plumbing Works, Bolton.
Telegrams: "Saturators Bolton." Telephone 0848.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
Firth Blakeley, Sons, and Company, Limited, Church Fenton, near Leeds.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.
Twice as rich as Bog Ore.
Gives no back Pressure.
The Cheapest in the Market.
Read Holliday and Sons, Ltd., Huddersfield.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Creosylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 years. References given to Gas Companies.

TAR WANTED.

THE Burnden Tar Company (Bolton), Ld. Hulton Chemical Works, BOLTON.

TO GAS AND WATER OFFICIALS.

BEFORE Purchasing your 1914 Cycle, kindly send post-card for our CATALOGUE, Cash or gradual Payments. Speciality, Slot-Meter Copper Collector. Melrose Cycle Co., Coventry.

PATENTS AND TRADE MARKS PUBLICATIONS: "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 248 Holborn.

SULPHURIC ACID — Specially prepared for Sulphate of AMMONIA and BENZOL Recovery Plants. John Nicholson & Sons, Ltd., Hunslet Chemical Works, Leeds. Tele.: "Nicholson, Leeds." Telephone: (Two Lines) Nos. 3420 and 3421.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the Enrichment of Gas.
Manufactured and Supplied by C. Bourne, West Moor Chemical Works, Killingworth, or through his Agents, F. J. Nicol & Co., Pilgrim House, Newcastle-on-Tyne.
Telegrams: "Doric," Newcastle-on-Tyne. National Telephone No. 2497.

GAS Company Secretary and Accountant, Smart and Ambitious (age 33), with a thorough Practical Knowledge of the Routine of the Business; also a General Experience of the Management of the Works (takes Full Charge in absence of Manager), desires a Change to a Larger or Progressive Company in the same Capacity. Twelve Years with present undertaking in the Midlands making 25 Millions. First-class Credentials. Would take up Shares. Could be at liberty March 1, 1915.
Address, No. 5941, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WEYMOUTH CONSUMERS' GAS COMPANY.

REQUIRED, by the above Company, an Efficient ENGINEER and MANAGER having a Good Practical Experience of Gas Manufacture and Distribution, and of the Manufacture of Sulphate of Ammonia. Annual make of Gas, 150 Millions.
Applications, stating Qualifications, Experience, Age, and Salary required, accompanied by *copies* of not more than Three Testimonials, to be sent to the Chairman of the Company, 71, St. Thomas Street, Weymouth, on or before the 28th inst.

E. Y. Wood,
Secretary.

Nov. 5, 1914.

COUNTY BOROUGH OF BURNLEY.
(Gas Department.)

THE Gas Committee of the Corporation of Burnley require the services of an ASSISTANT DISTRIBUTION SUPERINTENDENT.
Applicants must have a thorough knowledge of Main and Service Laying and Gas Fitting in all its Branches, and must be Competent to Advise Consumers on Matters relating to Lighting by Low and High Pressure Gas, Cooking, Heating, and Industrial Appliances.
Wages to commence at £2 2s. 6d. per week.
Duties and Form of Application may be obtained from the undersigned.
Applications must be sent in not later than Monday, the 23rd inst.

Jno. P. Leather,
Gas Engineer.

Gas-Works, Burnley,
Nov. 3, 1914.

THE Redhill Gas Company require (for the period of the War) Two CLERKS in the Distribution Department. Must be Quick and Accurate Book-Keepers, good Writers, and able to Advise Consumers in the Show-Rooms.
Applications, stating Experience, Salary expected, and accompanied by References, to be addressed to W. H. Bennett, Gas Office, Redhill.

WANTED, Several Main and Service LAYERS.
Apply, stating Wages required, to J. D. Ashworth, Gas-Works, Portsmouth.

STOKERS.

WANTED, immediately, Two Shovel CHARGING, 5s. 8d. per Shift. Permanency for Good Men.
Apply Gas-Works, Lodgwood, Huddersfield.

ADVERTISER is prepared to Pay a Commission to anyone Introducing a SMALL GAS-WORKS that can be PURCHASED for Cash, where there is Scope for Development.
Particulars in Confidence, or write for interview to "Principal," Scripps's Advertising Offices, 13, South Molton Street, W.

WANTED to Purchase or Hire several good TANK-WAGGONS; also Two old TANK-WAGGONS for Siding Work.
Address No. 5955, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

TANKS for Sale.—One Boiler Tank, 6 ft. 6 in. diameter by 20 feet long. One ditto, 6 feet diameter by 16 feet long. STEEL TANK, 20 feet diameter by 12 feet deep. CAST-IRON TANK, 21 feet diameter by 10 feet deep. CAST-IRON TANK, 10 feet by 8 feet by 4 feet deep. Also other sizes. All Accessories for Gas-Works. Enquiries solicited.
Firth Blakeley, Sons, and Company, Limited, Church Fenton, Leeds.

CITY OF NOTTINGHAM.

THE Works and Ways Committee are prepared to receive TENDERS for the Supply of the undermentioned STORES and MATERIALS; the Contracts to commence on the 1st of January next, and to terminate on the 31st of December, 1915:—

(*a*) CEMENT.
(*b*) BLUE LIAS LIME.
(*c*) RED BRICKS.
(*d*) BLUE BRICKS.
(*e*) TIMBER.
(*f*) EARTHENWARE PIPES, &c.
(*g*) EARTHENWARE PIPES, &c. (Patent Joints).
(*h*) IRON CASTINGS, IRON GULLEYS, &c.
(*i*) YORKSHIRE FLAGS, KERB, &c.
(*j*) GRANITE SETTS, KERB, and BROKEN GRANITE.
(*k*) IRONSTONE SLAG, CHIPPINGS, &c.
(*l*) RIVER GRAVEL.
(*m*) COAL.
(*n*) PICKS, SHOVELS, SCOOPS, &c.
(*o*) IRONMONGERY.
(*p*) SCAVENGING and other BRUSHES.
(*q*) DISINFECTANTS.
(*r*) REFINED TAR.
(*s*) PITCH.
(*t*) CREOSOTE OIL.

Forms of Tender may be obtained on applying to Mr. Arthur Brown, M.Inst.C.E., City Engineer, Guildhall, Nottingham, on payment of a deposit of 5s. each, which will be returned on receipt of a *bona-fide* Tender, in accordance with the Specification, providing such Tender is not withdrawn, and is Delivered by the time stated below.
Patterns and Samples may be inspected at the Eastcroft Depôt, London Road, Nottingham.
The Committee will not consider any Tender except on the authorized Form of Tender, which must be Delivered to the undersigned, in the official envelope provided, on or before Thursday, the 3rd of December, 1914.
The lowest or any Tender will not necessarily be accepted, and Tenders will only be accepted from persons who conform to the conditions as regards paying the Local Standard Rate of Wages, &c., and to the working rules of the Nottingham District applicable to the various trades.

By order,
W. J. Board,
Town Clerk.

Guildhall, Nottingham,
Nov. 11, 1914.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to Messrs. A. & W. Richards, at 18, Finsbury Circus, E.C.

By order of the Directors of the
LEA BRIDGE DISTRICT GAS COMPANY.

NEW ISSUE OF £15,000 CONSOLIDATED ORDINARY STOCK.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 1, at Two o'clock.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 500 £10 NEW ORDINARY FIVE PER CENT. MAXIMUM SHARES.

MESSRS. A. & W. RICHARDS will SELL THE ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 1, at Two o'clock.
Particulars of the Auctioneers, 18, Finsbury Circus, E.C.